Epiphan Pearl Mini

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At Epiphan Video ("Epiphan"), building reliable video systems with pro features that perform above your expectations is our mission.

We value your feedback! Email us your suggestions and let us know how you think we're doing and where you'd like to see our products improve: info@epiphan.com

Warranty

All Epiphan Systems products are provided with a 100% return to depot warranty for one year from the date of purchase.

Technical support

Epiphan's products are backed by our professional support team. You can reach our team several ways:

- Email support@epiphan.com
- Live chat from our support site https://www.epiphan.com/support/
- Phone toll free at 1-877-599-6581 or call +1-613-599-6581

Gather as much information about your problem as you can before you contact us so we can help you better, including:

- A description of the problem
- Details about your video or audio source (type, connection, resolution, refresh rate, etc.)
- Product serial number
- Product firmware version (using the admin interface)
- Product LED lights

Overview of Firmware Release 4.5.0

Firmware 4.5.0 is the initial release of Epiphan Video's Pearl Mini portable, all-in-one video production system that records, streams, and live switches. We hope that you enjoy using your Pearl Mini for live event production, lecture capture, and many other applications.

Firmware 4.5.0 is released exclusively for this first release of Pearl Mini and builds upon the underlying software code that's already used for our existing line of Pearl products. As such, we've included statements about any performance enhancements we've made that affect the underlying code and included the historical list of Limitations and known issues with updates to reflect the current status of the firmware.

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Start here

Welcome, and thank you for buying Epiphan Pearl Mini™. You'll find all the information you need to set up and start using your system in this user guide. For a product description, see What is Pearl Mini?.

See the Quick start for basic steps to get a single video source (and optional audio) set up so you can stream and record some output right away. The rest of the guide shows you how to tweak the system exactly how you want it so you can take advantage of the many advanced features.

About this Guide

After the introductory section and quick start, the next chapter describes the main user interfaces that are used to operate and configure Pearl Mini. You'll find everything that you need to successfully access and use these interfaces:

- Touch screen
- Admin Panel
- Epiphan Live

The rest of the user guide covers setting up and operating your system for a successful video switching, recording, and live streaming experience. The chapters are organized in to these five categories: Setup, Capture, Stream, Record and Maintenance.
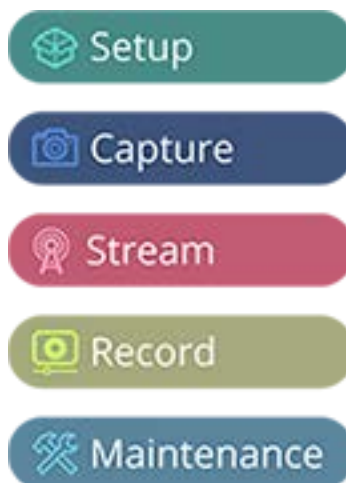
What is Pearl Mini?

Pearl Mini is a versatile live video production device that's a video encoder, video streamer, live switcher, and video recorder all in one. Pearl Mini is great for lecture capture applications.

With Pearl Mini, you can capture, record and stream computer monitors, radar displays, or anything that outputs to SDI, HDMI™, or DVI-I (single link). Capture audio via XLR, ¼ TRS, RCA, 3.5 mm, SDI or HDMI.

Simultaneously capture up to *three audio visual sources and choose how you want to record and stream them. Have separate ISOs or create custom layouts with multiple video sources for live switching. You can do all that using Pearl Mini.

Easily watch live streams using your favorite web browser or media player on mobile devices and computers connected to the same private network as Pearl Mini or using Content Distribution Networks (CDNs). Recorded files can be downloaded via FTP or set to automatically upload over FTP, RSYNC, or CIFS and can be integrated into your Content Management System (CMS).

> Pearl Mini does not capture from HDCP encrypted sources.

* Pearl Mini supports up to three video inputs with certain conditions, see AV inputs.

Front and back view Pearl Mini

Table 1 *Pearl Mini front panel descriptions*

Label	Name	Description
1	Power light	Glows when the system is powered on.
2	Streaming light	Glows when the system is streaming. Flashing means that user action is required and streaming has either stopped or won't start.
3	Recording light	Glows when the system is recording. Flashing means that user action is required and recording has either stopped or won't start.
4	Touch screen front panel display	Used for confidence monitoring and simple configuration, such as obtaining system information and starting/stopping recordings.
5	SD card slot	Used to store up to 512 GB of recordings and user uploaded media files. For recommendations, see Tech specs.
6	USB 3.0 port	For connection of external hard drives or flash drives for copying data to a USB drive, see AFU or copy to USB
7	3.5 mm audio output jack	For audio confidence monitoring. Plays the audio for the currently visible channel.

> **STOP** Do not insert objects in to the two, pin-sized holes that are located beside the LEDs.

Table 2 *Pearl Mini back panel descriptions*

Label	Name	Description
1	Lock	Allows Pearl Mini to be locked to a desk or surface using a laptop lock cable.
2	Power button	Press to toggle Pearl Mini on and off. If a software shutdown is performed when the toggle switch is in the on position, double press the power button to turn on Pearl Mini.
3	Power jack	Plug the power supply in here. The port requires a 12 V DC power source (center-positive). Always use the provided power supply.
4	USB 3.0 ports	For connection of external hard drives or flash drives. For copying data to a USB drive, see AFU or copy to USB.
5	HDMI output port	See Video output ports for details.
6	RJ-45 Ethernet	Auto-sensing gigabit Ethernet 10/100/1000 Base-T network port. See Configure network settings for setup instructions.
7	SDI in	Connect up to 3G SDI signals to Pearl Mini.
8	HDMI in	Connects HDMI and DVI signals (using an adapter) to Pearl Mini.

Label	Name	Description
9	RCA audio in	RCA consumer line-level stereo pair (left/right) audio inputs. See AV inputs.
10	3.5 mm audio in	Stereo mic-level input to connect a passive or active stereo electret microphone.
11	XLR/TRS combo jacks	Two XLR /TRS combo jacks that can function as a stereo pair (left/right) or as two mono inputs. See AV inputs. • Two XLR mic-level (balanced) • Two TRS ¼" professional line-level, +4 dBu (balanced/unbalanced)
12	Phantom power light	Glows when 48 V phantom power is enabled. Phantom power is applied to both XLR audio input ports when enabled. See Enable or disable phantom power. **WARNING**: Connecting devices that are not designed for phantom power when phantom power is enabled for the two XLR ports can seriously damage those devices. Always check the phantom power LED before connecting devices to the XLR ports.

SD card installation and file management

Pearl Mini comes with a standard SD card slot on the front panel. An SD card is needed when recording video. If you're only switching video or live streaming, then you don't need to install an SD card.

We recommend using a minimum class 10 (C10) SD card that's at least 64 GB capacity but does not exceed 512 GB; however, most SD cards that are at minimum a C10, a UHS class 1 (U1), or a video speed class 10 (V10) should work. We've tested various SD cards with Pearl Mini, including:

- Kingston 16 GB U1 / C10

- Sony 32 GB U3 / C10

- SanDisk 64 GB U1 / C10

- PNY 256 GB U3 / C10

- AData 128 GB U3 / V90

When the SD card is full, new recordings overwrite the oldest recordings. Do not eject the SD card while recording is in progress as that may corrupt the SD card. Power off Pearl Mini before you swap SD cards.

The SD card must be EXT4 formatted for the Ubuntu operating system. You can format the SD card using the Admin panel, see Format the SD card.

> **STOP** The Ubuntu formatted SD card cannot be used to transfer files to iOS or Windows systems. Any content that's contained on the SD card is lost when the SD card is formatted.

For important considerations when setting the maximum file size limit and recording to the SD card, see About recording.

Quick start

Pearl Mini comes shipped with a power supply and cable, a quick start guide, and a registration card. After you've unpacked your Pearl Mini, you're ready to get started. This quick start uses the default settings where possible so you can quickly start using your Pearl Mini.

Before you begin, make sure you have:

- a video source such as a camera or computer and cables to connect them to Pearl Mini. For HDMI, the video source must not be HDCP protected.

- an audio source coming from either your SDI or HDMI video source (must not be encrypted). Optionally, audio from a different source, such as an audio mixer or microphone that you connect to the audio input ports can be used.

- Local area network that uses Dynamic Host Configuration Protocol (DHCP) is preferable.

- Computer with a web browser connected to the same network. We'll call it the "admin" computer.

- (Optional) A formatted SD card if you plan to record video using Pearl Mini. We recommend an SD card that is at least a class 10 with up to 512 GB of capacity. The SD card must be EXT4 formatted, see SD card installation and file management.

Starting up!

Pearl Mini is pre-configured with two channels: HDMI-A and HDMI-B. The HDMI-A video input port on Pearl Mini is assigned to the HDMI-A channel and the HDMI-B video input source is assigned to the HDMI-B channel by default.

When you first start your Pearl Mini, the video sources you've connected to the HDMI-A and HDMI-B input ports appear automatically in their assigned channels, along with the associated HDMI audio. If no video source is connected, a standard No Signal screen displays.

> The channel's frame size is set to match the video input by default and the best bit rate for the default frame rate of 30 fps is applied to the channel automatically. Audio for the channel comes from the video source that is connected to the HDMI port by default.

1. Turn on your camera or video source and connect the output to the HDMI-A input port on the back panel of Pearl Mini.

2. (Optional) Connect a second video source to the HDMI-B port.

3. Connect the Ethernet cable to Pearl Mini and to your network.

4. Attach the power cable and plug it into a power source.

5. Press the power button on the back of Pearl Mini to turn on the system. Wait for the power cycle to complete.

    The Grid view showing both channels appears on the touch screen. The video source you connected to the HDMI-A port appears in channel HDMI-A, and the video source connected to the HDMI-B port appears in channel HDMI-B.
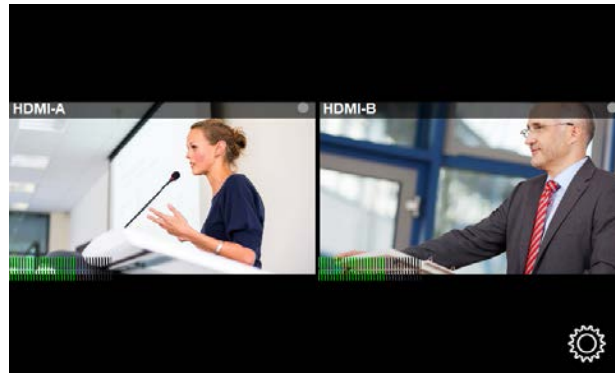
6. Use the touch screen on Pearl Mini for confidence monitoring. To display the single Channel view, simply tap on one of the channels that you see in the Grid view. From the Channel view, you can do things like stop and start recording for the channel.

7. (Optional) Plug speakers or headphones into the 3.5 mm headphone jack at the front of Pearl Mini. For more about monitoring audio, see Monitoring audio.

My network IP address and channel monitoring

You can get the network IP address of your Pearl Mini from the touch screen so that you can do things like view the channels using a web browser or access the configuration Admin panel. Just make sure that your admin computer is connected to the same network as Pearl Mini.

1. To find the IP address using the touch screen, tap the **gear** icon in the bottom right corner of the screen and select **System Status**. If the control icons aren't displayed, tap anywhere on the touch screen.

2. Using a browser on the admin computer, go to one of the following URLs to preview the channel.

> **For HDMI A:** http://*<IP Address for Pearl Mini>*/preview.cgi?channel=1
> **For HDMI B:** http://*<IP Address for Pearl Mini>*/preview.cgi?channel=2
>
> **For example:**http://192.1.10.100/preview.cgi?channel=2

3. (Optional) Open a new tab in your browser and enter the URL to login to the Admin panel.

> http://*<IP Address for Pearl Mini>*/admin
>
> **For example:**http://192.1.10.100/admin

The default user name **admin** has no password set by default. If a password has been set, consult with your system administrator for the login credentials , see User types and privileges. For Admin panel login details, see Connect to the Admin panel.

Install a formatted SD card to record a channel

An SD card must be installed and formatted before you can record video using Pearl Mini. You'll need to log in to the Admin panel using the IP address of your Pearl Mini to format the SD card, see Format the SD card.

After the SD card is installed and formatted, it's easy to start recording your channel from the Channel view using the touch screen. Just tap the red dot that appears in the top right corner of the screen to start and stop recording the channel. The dot flashes while recording.

Recordings are saved to the SD card by default. You can not manually transfer recordings off the SD card to iOS or Windows systems. Download recordings using the Admin panel. For other options, like downloading to a USB memory device or using Automatic File Uploads, see File and recording transfer.

> 🛑 Ejecting the SD card while the recording is in progress may corrupt the SD card and cause loss of data. Power down Pearl Mini before ejecting the SD card. Stop all recordings before powering down the system.

You can also control recording using the Admin panel or Epiphan Live. For more information about using Epiphan Live, see About Epiphan Live.

To format an SD card and control recording using the Admin panel:

1. Insert the SD card into the SD card slot on Pearl Mini.

2. Using a web browser on the admin computer, go to the IP address of your Pearl Mini and log in, see Connect to the Admin panel.

3. From the Configuration menu, click **SD Card**. The SD Card configuration page opens.

4. Select either quick disk format or the full disk format, then click **Format**. Do not eject the SD card while it is being formatted.

5. From the **Channels** menu, select your channel (either HDMI-A or HDMI-B) and click **Recording**. The Recording page for the channel opens.

6. Click the red **Start** button. The text at the top of the screen changes to indicate the recording is starting and the record timer increments.

7. Click the black **Stop** button to stop recording.

8. Refresh the page to see the newly recorded file appear in the list.

9. Click the file to download the recording to your admin computer.

What's Next?

Now that you have a source setup and are ready to stream, you can fine-tune the system to your exact requirements. Take a look at topics such as:

- Live video mixing / switching
- Selecting an audio source
- Video output ports
- File and recording transfer
- Custom layout configuration
- What is streaming?
- User administration

When you're done setting up your Pearl Mini, make sure to back up the system configuration using the procedure described in:

- Create a configuration preset

Live video mixing / switching

Create dynamic content for your viewers to watch while you record and stream your program using Pearl Mini. Using the custom layout editor, you can create different layouts, like picture in picture or side-by-side views of a camera and slides, then easily switch between layouts with either a tap on the touch screen, using Epiphan Live on a mobile device, or from the Admin panel.

Your program stream with switched layouts could look like this:

To create a program channel with custom layouts using the custom layout editor that you can switch, see What is a channel?.

For instructions on how to live switch, see:

- Switching / mixing using the touch screen
- Switching / mixing using Epiphan Live
- Switching / mixing using the Admin panel

Monitoring audio

Pearl Mini's front panel includes a 3.5 mm audio jack for monitoring audio. You can plug external speakers or headphones into the 3.5 mm audio jack. To monitor the audio for a channel, just select the channel using the touch screen. The audio you hear depends on which layout is currently live because different layouts can have different audio sources configured.

Adjust the volume

Tap the headphones icon on the touch screen to adjust the volume. Each tap increases the volume by 25% to a maximum volume of 100%. Tapping the headphones icon when the volume is at 100% mutes the volume. You can also long press the headphones icon to mute and unmute the volume.

Volume is muted.	25% volume.	50% volume.	75% volume.	100% volume.

At 75% volume, what you hear corresponds to the nominal audio level in the VU meter at approximately where the green bars change to yellow. Increasing the volume to 100% may cause you to hear distortion that is not actually present in the audio signal being recorded and streamed.

Audio VU meter

A VU meter on the touch screen shows the audio levels for the selected channel. The value is displayed in dBFS (decibels relative to full scale). Colored bars represent the audio level.

Channels that have stereo audio display two bars. The top bar is the left audio channel and the bottom bar is the right audio channel.

VU meter (mono)	
VU meter (stereo)	

Table 3 *Audio VU meter levels*

Color	Decibel range
Red	0 to -9 dBFS
Yellow	-9 to -18 dBFS
Green	-18 dBFS and lower

The VU meter appears in several different places so you can visually check audio levels:

- **Touch screen**: On the individual channel view and the grid view. If the audio meter isn't showing, tap anywhere on the touch screen to turn on the control icons.

- Admin panel: On the audio input source's configuration page when you select the input source from the Inputs menu. You can also add the VU meter to appear on the video output ports, see Disable or enable audio and output port volume.

- **Epiphan Live**: See Monitor video and audio input sources

Selecting an audio source

The audio that's coming from the connected HDMI video sources (HDMI-A and HDMI-B) is automatically used as the default audio source for the HDMI-A and HDMI-B channels on Pearl Mini. You can choose different audio sources for a channel using the Admin panel and do things like adjust the input gain, see Adjust audio gain and delay.

There are:

- Two XLR/TRS combo jacks.

  - XLR mic-level input (balanced), supports 48 V phantom power

  - TRS ¼" professional line-level input, + 4.0 dBu up to 12.3 V (RMS), (+24 dBu) (balanced/unbalanced)

- One 3.5 mm stereo mic level input for electret microphones (unbalanced)

- One stereo pair RCA consumer line-level input (-10 dBV)

The XLR and TRS combo jacks are configured as a left/right stereo pair by default, see Configure audio ports for stereo or mono.

This table offers some guidelines for adjusting the gain at the audio input port of Pearl Mini for common types of audio input devices. You should add the suggested gain to the audio input to get an average signal to register at a nominal level in the VU meter (i.e. where the green bars change to yellow). The actual amount of gain needed depends on the strength of the original audio signal.

Audio source	Input port	Gain
Dynamic microphone	XLR	Add +50 to +60 dB gain to the audio input port.
Electret microphone	XLR	Add +18 to +40 dB gain to the audio input port.
	3.5 mm	Add +6 to +12 dB gain to the audio input port.
Wireless microphone receiver	XLR	Add +18 to +40 dB gain to the audio input port.
	3.5 mm	Add +6 to +12 dB gain to the audio input port.
Condenser microphone with phantom power	XLR	Add +40 to +60 dB gain to the audio input port.

Audio source	Input port	Gain
Mobile phone or other consumer line level device	TRS	Add +6 to +12 dB gain to the audio input port.
	RCA	Nominal
Professional mixer	TRS	Nominal
	RCA	Not recommended.

> **STOP** Connecting devices that are not designed for phantom power when phantom power is enabled for the two XLR ports can seriously damage those devices. Always check the phantom power LED before connecting devices to the XLR ports.

To choose a different audio device for the channel:

1. Using a web browser on the admin computer, go to the IP address of your Pearl Mini and log in, see Connect to the Admin panel.

2. From the Channels menu, select your channel (either HDMI-A or HDMI-B) and click **Layouts**. The custom channel layout editor page opens.

3. Check the audio source that you want to use for the layout and click **Save**.

Audio sources:

Audio inputs
- ☐ 🎤 XLR/TRS Audio 1
- ☐ 🎤 XLR/TRS Audio 2
- ☐ 🎤 RCA/3.5mm Audio
- ☑ 🎤 HDMI-A Audio
- ☐ 🎤 HDMI-B Audio
- ☐ 🎤 SDI Audio

Channels
- ☐ 🖥 HDMI-B
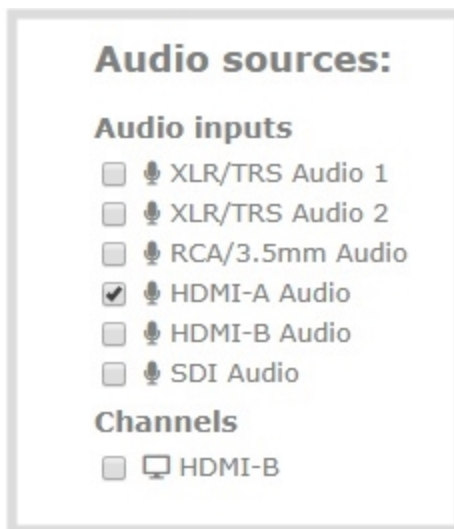
4. (Optional) Adjust the gain for an audio input source, select the input port from the Inputs menu and adjust the amount of gain on the configuration page for the audio input port. Click **Save** when you're done. For more details, see Adjust audio gain and delay.

Specifications

Topics include:

- AV inputs
- Tech specs
- Optimum CPU performance
- Vesa mounting the device

AV inputs

When using Pearl Mini, we recommend using two video sources in up to two full HD channels simultaneously for best performance. However, you can connect up to three video sources to Pearl Mini in the following scenarios:

1. One 1080p 30 fps channel configured with three layouts, one for each full HD video source without any scaling and make the video image fill the whole frame.

2. Two 1080p 30 fps channels: one channel for a picture in picture switched program for HD recording at 1080p30 fps at 8 Mbps, and a second channel with duplicate content at a lower resolution of 720p30 fps at 2 Mbps for streaming that uses the first channel as the video source, see Add video sources or a channel as a source. The switched program can have up to three layouts: two that are picture in picture that includes your main camera and one other video source such as a document camera or a laptop with slides, and a third layout of your main camera.

Pearl Mini support the use of many common signal converters and input adapters.

Table 4 Pearl MiniInput Ports

Input port	Qty	Details
SDI[1]	1	Linear PCM audio/video input. Supports up to 3G-SDI signals.
HDMI™	2	Linear PMC audio/video input, non-HDCP protected. DVI-I (using an adapter) is single link.
RCA	2	RCA consumer line-level audio inputs function as a stereo pair (-10 dBV). - White = left - Red = right
3.5 mm	1	Mic-level input to connect a passive or active stereo electret microphone (unbalanced)

Input port	Qty	Details
XLR	2	Combo XLR / TRS audio inputs operate as a stereo pair (left/right) by default. • XLR/TRS 1 = left • XLR/TRS 2 = right You can configure the two ports to operate as independent mono inputs using the Admin panel, see Configure audio ports for stereo or mono. XLR mic-level (balanced) inputs supply optional 48 V phantom power across both XLR ports. See Enable or disable phantom power. **STOP** Connecting devices that are not designed for phantom power when phantom power is enabled on the XLR ports can seriously damage those devices. Always check the phantom power LED before connecting devices to the XLR ports. A direct box can be used to provide the correct mic-level signal to the XLR port and offers some isolation protection in case of accidental exposure to 48 V phantom power.
TRS	2	Combo XLR / TRS audio inputs operate as a stereo pair (left/right) by default. • XLR/TRS 1 = left • XLR/TRS 2 = right You can configure the two ports to operate as independent mono inputs using the Admin panel, see Configure audio ports for stereo or mono. TRS inputs accept balanced and unbalanced, pro line level signals (+4.0 dBu) up to 12.3 V (RMS), (+24 dBu).

[1] SD-SDI audio is not supported

[2] You cannot use both XLR audio inputs and the TRS audio inputs at the same time.

Only content that is not HDCP-protected is captured from HDMI and SDI sources.

Tech specs

The input and output connectors are listed for Pearl Mini.

For the most up-to-date product specifications and information, go to www.epiphan.com/pearl-mini.

Table 5 *Specifications for Pearl Mini*

Video inputs	Connectors	(1) 3G-SDI (2) HDMI™
	Resolutions	Most common and custom SDI/HDMI modes up to 1920×1200
	Video formats	3G-SDI; HD-SDI; SD-SDI HDMI
Audio input	Connectors (balanced or unbalanced signals)	(2) XLR mic level (balanced) with optional phantom power. Operates as a stereo pair (left/right) or as two mono inputs. (2) ¼" TRS professional line-level + 4.0 dBu accepts balanced or unbalanced signals. Operates as a stereo pair (left/right) or as two mono inputs. (1) Stereo RCA consumer line-level, - 10 dBV (1) Stereo 3.5 mm mic-level (unbalanced) for electret microphones (1) SDI audio[1] (2) HDMI audio
	Analog audio max. input levels	TRS maximum signal level: 12.3 V (RMS), (+24 dBu) RCA maximum signal level: - 10 dBV
Video output	Connectors	(1) HDMI output with audio for external display confidence monitoring
	Built-in display	Touch screen display for confidence monitoring, viewing system information, set up, and simple switching, streaming, and recording control
Audio output	3.5 mm audio	Front-mounted headphone jack for confidence monitoring

	Video codecs	H.264, Motion JPEG
Video encoding	Video bitrates	1 - 50 Mb/s
	Key frame intervals	Programmable
	Color resolution	4:2:0
	Output frame size	Configurable up to 1920×1200
	Encoded programs	Two simultaneous 1920×1080 programs capturing and streaming at 30 fps with up to two Full HD sources (recommended), or One 1080p program at 30 fps with up to three Full HD sources (without scaling[2])

		Encoder	Bitrate	Sample Frequencies
Audio encoding	Audio codecs	MP3	64-320 kbps	16 kHz, 22 kHz, 44 kHz, 48 kHz
		PCM	-	16 kHz, 22 kHz, 44 kHz, 48 kHz
		AAC	64-320 kbps	16 kHz, 22 kHz, 44 kHz, 48 kHz

IP network interfaces	Connector	(1) 10/100/1000 Ethernet RJ45
	Streams	MPEG-TS, and FLV
		RTSP over TCP/UDP
		Multi-Publish to Streaming Server / CDN (RTMP)
		HLS - Native Apple HTTP stream for iPad, iPhone and iPod Touch
	Multicast streams	RTP, MPEG-TS & RTP and MPEG-TS over UDP
	Network discovery / announce	UPnP, SAP

Video / audio recording and file management	Local SD card storage[3]	Up to 512 GB (EXT4 formatted internal storage)
	Local USB 3.0	Automatic or manual copy to local USB drives via the USB 3.0 ports
	Network storage	FTP server and FTP client capabilities, SFTP, SCP, RSYNC,

		CIFS, AWS, or WebDav servers
	Playback and recorded formats	Download recorded videos (AVI, MOV, MP4 or MPEG-TS)
Administration	Web UI for full administration. On-screen display and mobile UI for confidence monitoring, simple administration and control.	
	Multiple user accounts/passwords.	
	API for integration into existing environments (HTTP and RS-232).	
Time synchronization	NTP, TIME (RFC 868), PTP v1 (IEEE-1588-2002 V1)	
Power supply	1.5 A, 100-240 VAC, 50 to 60 Hz (60W); 1.3 A, 100-240 VAC, 50 to 60 Hz (84W)	
Input power rating	12 VDC, 5.0 A (maximum / 60W PSU); 12 VDC, 7.0 A (maximum / 84W PSU)	
Operating temperature	32° to 104° F (0° to 40° Celsius)	
Product dimensions	10 1/4" × 6 3/4" × 2 3/8" (261 mm × 172 mm × 60 mm)	
Product weight	3.8 lbs (1.7 kg)	
Country of origin	Made in Taiwan	

[1] SD-SDI audio is not supported

[2] Pearl Mini supports up to three HD video sources in a single channel with two picture in picture layouts under certain conditions, see AV inputs.

[3] SD card is reserved for system use and cannot be used to transfer files to other devices, like a laptop. Use a USB memory device to manually transfer files instead.

Optimum CPU performance

Pearl Mini is a powerful live video production system; however, there's a limit to the number of concurrent tasks the onboard CPU can perform efficiently.

The number of concurrent tasks depends on many factors, like: how many channels you have, how many layouts you have per channel, how often you switch layouts, is the system resizing (scaling) video sources, what frame rate and bit rate is used per channel, are the video output ports used, etc.

For best results, we recommend keeping Pearl Mini's CPU usage under 70%. You can check the **Overall system load** from the **Info** page using the Admin panel.

If the system load is higher than recommended, you can:

- Disable the video output port (if unused).

- Remove unused channels or layouts.

- Reduce the number of channels created.

- Ensure video sources come in at the right resolution so that Pearl Mini doesn't have to up scale or down scale the video source.

Vesa mounting the device

The rear panel of Pearl Mini has vesa mounting holes to fit a standard, 75mm × 75mm vesa mount. Use four M4 screws with a maximum length of 5mm to mount the plate to the rear panel of Pearl Mini.
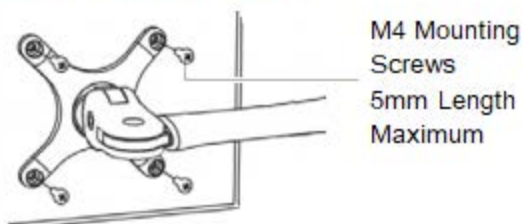
STOP Do not insert screws longer than the recommended 5mm. Using longer screws can damage the device.

User interfaces

Pearl Mini has three user interfaces:

- **Touch screen**: Easily accessible on the front panel of Pearl Mini, the touch screen is primarily used for confidence monitoring, live switching, and one-touch recording and streaming control, see About the touch screen.

- **Admin Panel**: A web-based user interface that's primarily used to perform system set up and administrative tasks for your Pearl Mini. You can access the Admin Panel using an internet browser on a computer or tablet that's connected to the same local Ethernet network as your Pearl Mini, see About the Admin panel.

- **Epiphan Live**: A web-based user interface that's primarily used for confidence monitoring, statistics, live switching, and recording control, see Epiphan Live.

The touch screen

Use the touch screen to switch layouts, start and stop recording and streaming, configure network settings, load configuration presets, and to view configured channels, audio meters, and system information.

Topics include:

- About the touch screen
- The Channel view
- Record a channel using the touch screen
- Stream a channel using the touch screen
- Switching / mixing using the touch screen
- Configure the touch screen
- Disable or enable the touch screen
- Hide or show channel previews on the touch screen
- Disable or enable the system status screen
- Disable or enable configuration using the touch screen
- Disable or enable recording, streaming and switching from the touch screen
- Set the touch screen timeout
- Set a 4-digit PIN security code

To view system information using the touch screen, see View system information using the touch screen

About the touch screen

Pearl Mini's front panel includes a touch screen display that's used for confidence monitoring, basic configuration, and one-touch streaming and recording control.

> **STOP** The touch screen is capacitive. Use your finger or a specially designed soft-tipped capacitive stylus with firm but gentle pressure. Pressing too hard or using something other than a fingertip or capacitive stylus can result in damage to the screen.

When you power on Pearl Mini, a grid view appears. The grid view displays all channels that are configured for your system. If you haven't created any channels yet, the grid view shows the two HDMI input ports by default.

In this example, the grid view shows two video sources, which are plugged into HDMI video input ports A and B on Pearl Mini.
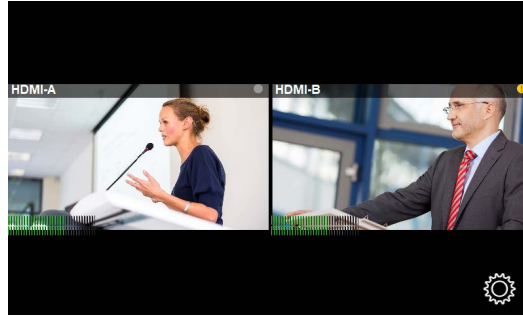
> If no video sources are connected, or your sources aren't sending a signal, the grid view shows no signal images.

Tap a channel on the grid view to select it and go to that channel's view. You can tap the grid icon to return to the grid view. Tap the **gear** icon at any time to go to system settings.

Grid icon

By default, the touch screen and all its features are enabled; however, you can disable the touch screen and define which features are enabled on the touch screen. If the touch screen is configured to not show channel previews, tap anywhere on the screen to go to the system settings screen. See Configure the touch screen for details.
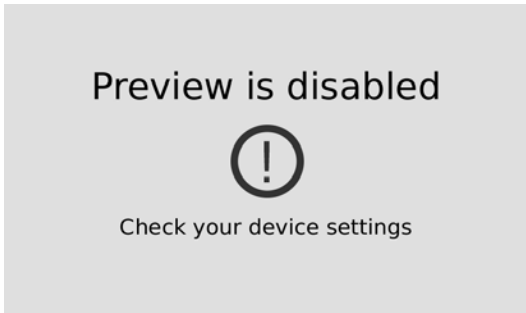
The Channel view

Each channel you configure on Pearl Mini can be monitored and controlled using the touch screen. After you power on Pearl Mini and the grid view opens, you can select a channel and open the channel view. Just tap the channel you want in the grid view and the channel view opens.

Table 6 *Parts of the touch screen for the individual channel view*

Item	Description
1	Channel name.
2	Streaming status. Gray means streaming is stopped, flashing blue means streaming in progress.
3	The streaming timer shows the length of time that streaming

Item	Description
	has been in progress.
4	Recording status. Bright red and flashing means recording is in progress.
5	The recording timer shows the length of time that recording has been in progress.
6 and 7	Controls to switch between channels. Tap the arrow to view the next (or previous) channel. The arrow icons fade when the touch screen is idle (i.e. untouched) for several seconds. Tap the touch screen and the icons reappear.
8	Audio VU meter uses quasi-peak ballistics with samples averaged every 10 ms. The maximum average audio level in each 100 ms period is displayed using colored bars. • RED = 0 to -9 dBFS • Yellow = -9 to -18 dBFS • Green = -18 dBFS and lower
9	Audio monitoring volume control icon. Tap to change volume level. See Monitoring audio for more information.
10	Live Switcher view icon. Tap to view the live switcher, which lets you live switch between different custom layouts that are configured for the channel.
11	Grid view icon. Tap to view all the configured channels in a grid.
12	Single touch streaming and recording control icon. See One Touch streaming and recording control
13	System settings icon. See View system information using the touch screen.

Record a channel using the touch screen

Use Pearl Mini's touch screen to easily start and stop recording of a channel. Simply tap the recording control button that appears in the channel view.

> If the red Record icon doesn't appear in the top right corner of the screen, recording is disabled. See **Disable or enable recording, streaming and switching from the touch screen** to enable recording.

To start and stop recording a channel using the touch screen:

1. From the grid view, select the channel you want to record. The channel view opens. If necessary, tap the screen once to display the controls.

2. Tap the red Record icon at the top right of the screen to start recording. The red dot flashes and the record timer increments when recording is in progress.
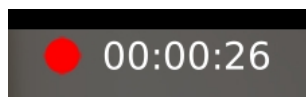
3. Tap the red Record icon again to stop recording. The dot stops flashing and the record timer resets to 00:00:00.

Pearl Mini also features **One Touch**, which lets you control recording and streaming of multiple channels and recorders at the same time with the touch of a button. See **One Touch streaming and recording control** for more information.

Stream a channel using the touch screen

Use Pearl Mini's touch screen to easily start and stop streaming a channel. Simply tap the streaming control button that appears in the channel view.

>
> If the gray (or blue) Stream icon doesn't appear in the top left corner of the screen, streaming is disabled. See **Disable or enable recording, streaming and switching from the touch screen** to enable streaming.

To start and stop streaming a channel using the touch screen:

1. From the grid view, select the channel you want to record. The channel view opens. If necessary, tap the screen once to display the controls.

2. Tap the gray Stream icon at the top left of the screen to start streaming. The Stream icon turns blue and the timer increments when streaming is in progress.
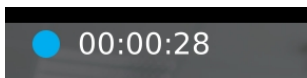
3. Tap the Stream icon again to stop streaming. The dot turns gray and the timer resets to 00:00:00.

>
> If an error occurs when you start streaming, a yellow circle with an exclamation mark appears in the left top corner of the touch screen. Check your networking and streaming settings.

Pearl Mini also features **One Touch**, which lets you control recording and streaming of multiple channels and recorders at the same time with the touch of a button. See **One Touch streaming and recording control** for more information.

Switching / mixing using the touch screen

Switching live video inputs, or video mixing, is simple and intuitive using Pearl Mini's touch screen. After you select the channel you want to live switch, just tap the layout switching icon to open the convenient switcher on the touch screen. All custom layouts that are configured for the channel display in the carousel. Just tap a layout to load it in to the standby panel and you're ready to start switching.

> Performing live switching using one interface, like the touch screen, does not dynamically update the visuals in the other interfaces (e.g. the Admin panel and Epiphan Live). The other interfaces must be manually refreshed to accurately reflect the current live switching layout information.

If the live switching controls don't appear on the touch screen, they may have been disabled, see Disable or enable recording, streaming and switching from the touch screen.

To switch custom layouts for a channel using the touch screen:

1. Tap the Live Switcher icon to open the live switcher view for the channel. If the control icons aren't showing, tap anywhere on the touch screen.

2. The Live Switcher view opens.

Tap to return to the channel view

Tap to make your preview layout the live layout

Preview panel

Live panel

Carousel with your channel's layouts

Colored-coded frames:
Red = Currently active (live)
Green = Currently in preview
Gray = Idle
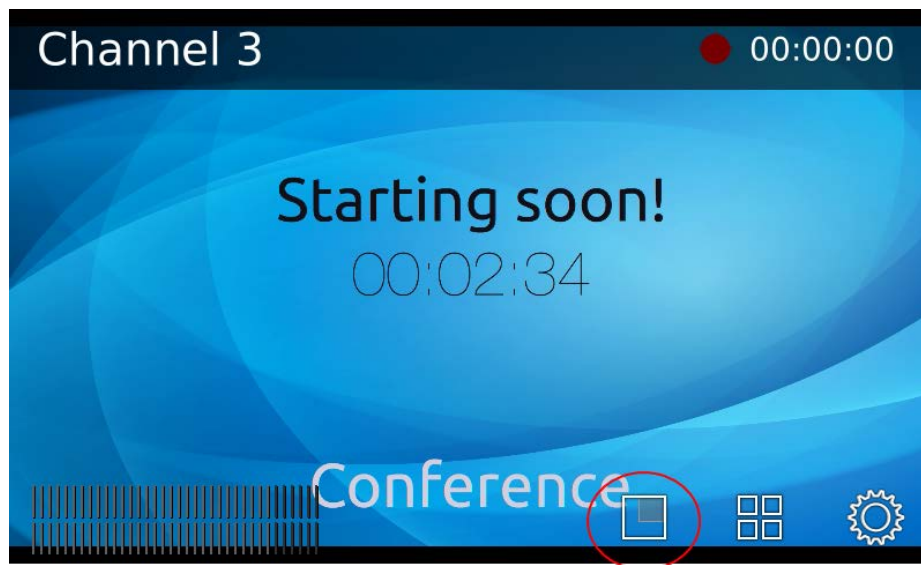
Scroll to see all layouts
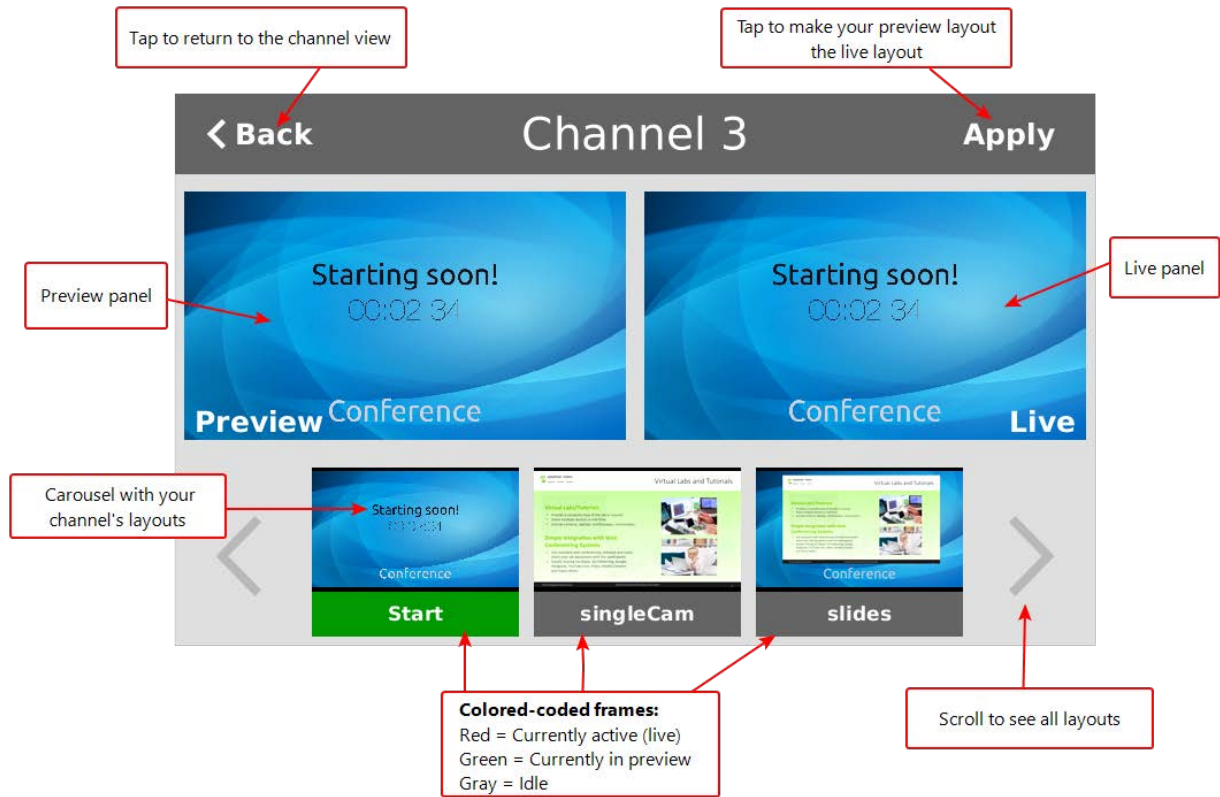
3. Tap any layout that appears in the carousel to load it in to the Preview panel.

4. Tap **Apply** or double tap inside the Preview panel to switch that layout to the Live panel.

5. Tap another layout in the carousel to load it in the Preview panel so that it's ready for the next time you switch layouts.

6. Tap **Back** to exit the Live Switcher view.

One Touch streaming and recording control

You can easily control streaming and recording from the touch screen on Pearl Mini with the press of a single button.

Topics include:

- About One Touch streaming and recording
- Specify channels and recorders for One Touch recording
- Specify channels for One Touch streaming
- Customize the One Touch control display

About One Touch streaming and recording

The One Touch feature lets you control the recording and streaming of multiple channels and recorders with the touch of a single button on the touch screen of Pearl Mini. You simply specify which channels and recorders to include for One Touch control using the Admin panel.

To open the One Touch control screen from the touch screen on Pearl Mini, simply tap the **One Touch control** icon.

Table 7 One Touch control screen components

Label	Description
1	**Start/stop button**: Press the One Touch control button to start or stop streaming and recording for all specified channels and recorders.
2	The number of recorders and/or channels that are actively recording (the first number) over the total number of channels that are configured for One Touch recording (the second number).
3	The number of channels that are actively streaming (the first number) over the total number of channels that are configured for One Touch streaming (the second number).

When you press the start button to activate One Touch recording and streaming, a blue **Stop** button appears, the Recording values update to show the number of channels and recorders that are actively recording, and the Streaming values update to show the number of channels that are actively streaming.
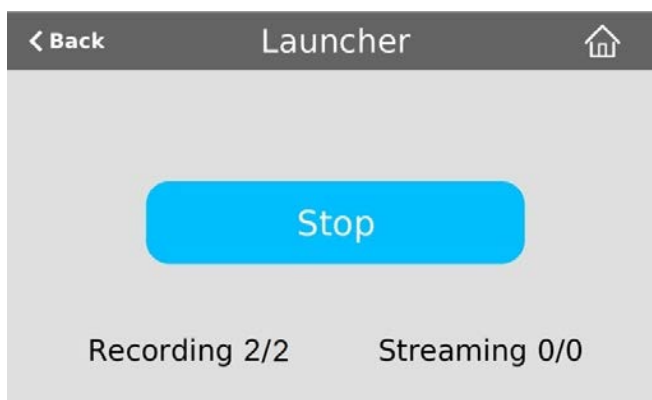
> In the example above, One Touch control has been activated and both channels out of the two total channels and/or recorders are recording successfully. There is no streaming activity because there are no channels configured for One Touch streaming.

An error icon displays if there's a problem with the streaming and/or recording settings for one or more of the channels and recorders. All other channels and recorders that are working correctly continue to stream and record normally.
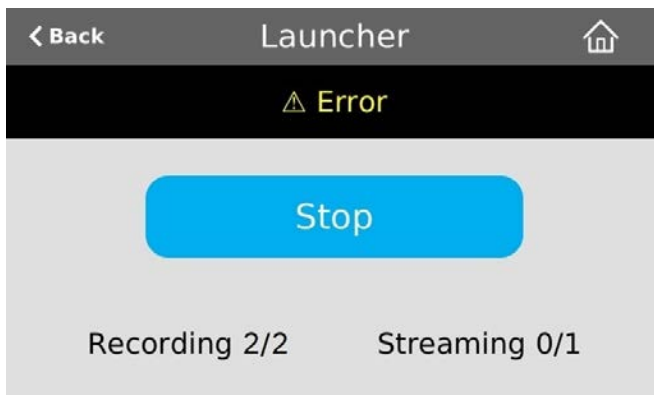
> In this example, after pressing **Start**, both recorders/channels are recording properly but the one channel configured for streaming is not streaming correctly.
>
> To troubleshoot, investigate each channel's streaming configuration page using the Admin panel and identify which channel isn't streaming. Then correct any streaming configuration errors.

See Specify channels for One Touch streaming and Specify channels and recorders for One Touch recording for more information about configuring channels and recorders for One Touch control.

Customize the One Touch control display

You can use the Admin panel to customize how One Touch Control is displayed on the touch screen of Pearl Mini:

- **Default**: The One Touch control screen is accessed by tapping the **One Touch control icon** at the bottom of the touch screen.
- **Start Screen**: The One Touch control screen displays automatically on the touch screen when you power on Pearl Mini. Operators can still navigate to other screens from the One Touch control screen.
- **Locked**: The One Touch control screen is the only screen that displays on the touch screen of Pearl Mini. Operators cannot navigate to other screens from the One Touch control screen.

To configure how the One Touch control screen displays on the touch screen:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Touch Screen**. The Touch screen configuration page opens.
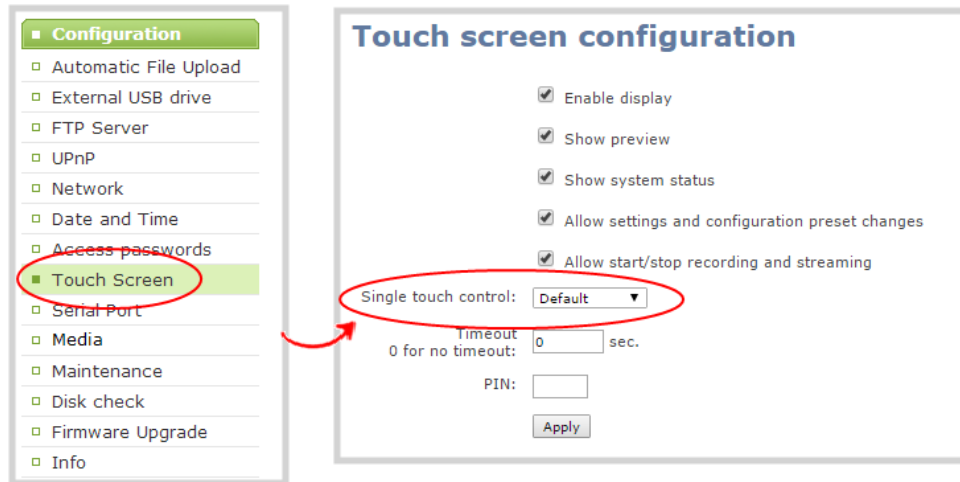
3. Click **Single touch control** and select either **Default**, **Start Screen** or **Locked**.

4. Click **Apply**.

> If you chose **Start Screen** or **Locked**, the touch screen automatically refreshes to display the One Touch control screen.

Specify channels and recorders for One Touch recording

All channels and recorders are enabled for One Touch recording by default. You can enable and disable One Touch recording control for individual channels and recorders using the Admin panel.

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. To enable or disable **Single touch control** for a channel.

    a. From the Channels menu, select the channel you want and click **Recording**. The Recording page opens.
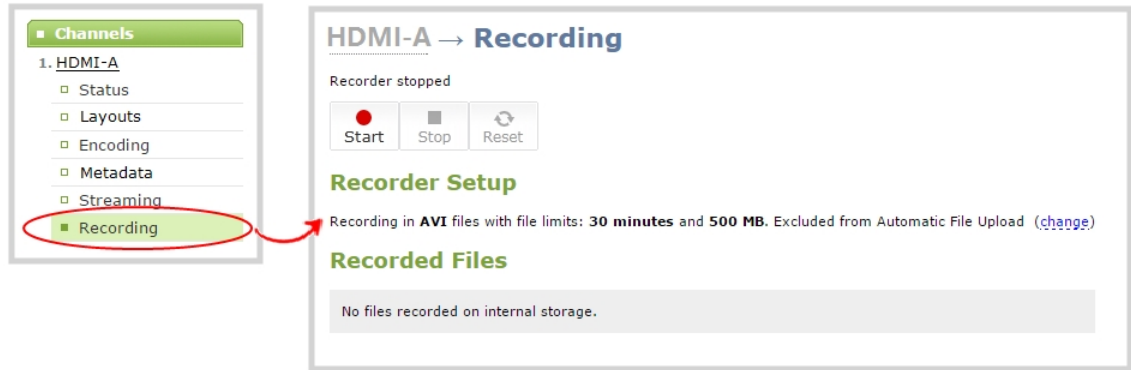
b.   Click **change**, and then check **Single touch control** on the options page to enable the channel
     for One Touch control. Uncheck the check box if you don't want to include that channel for One
     Touch control.
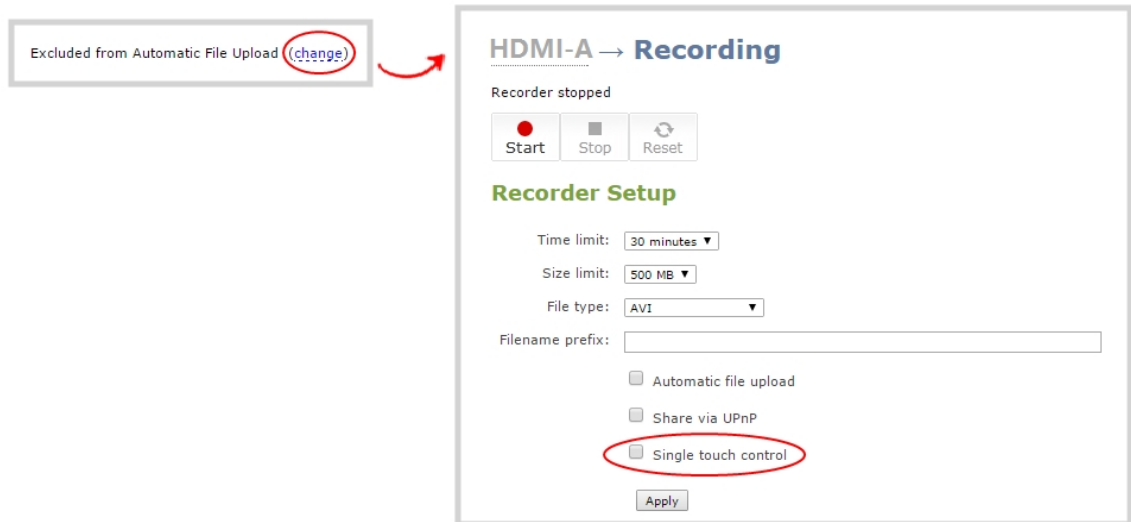
c.   Click **Apply**.

3.   To enable or disable **Single touch control** for a recorder.

a. From the Recorders menu, select the recorder you want. The Recorder Setup page opens.
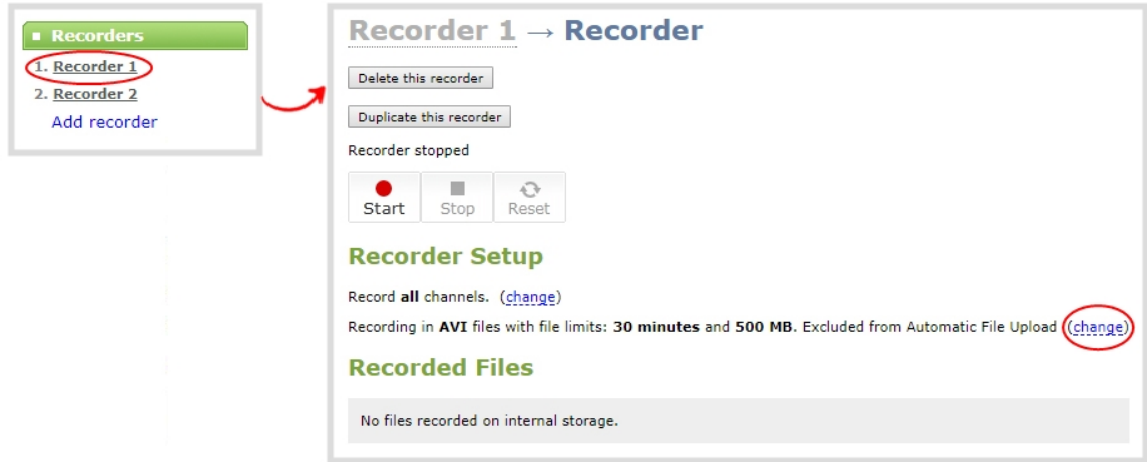
b. Click **change**, and then check **Single touch control** on the options page to enable the recorder for One Touch control. Uncheck **Single touch control** if you don't want to include that recorder for One Touch control.
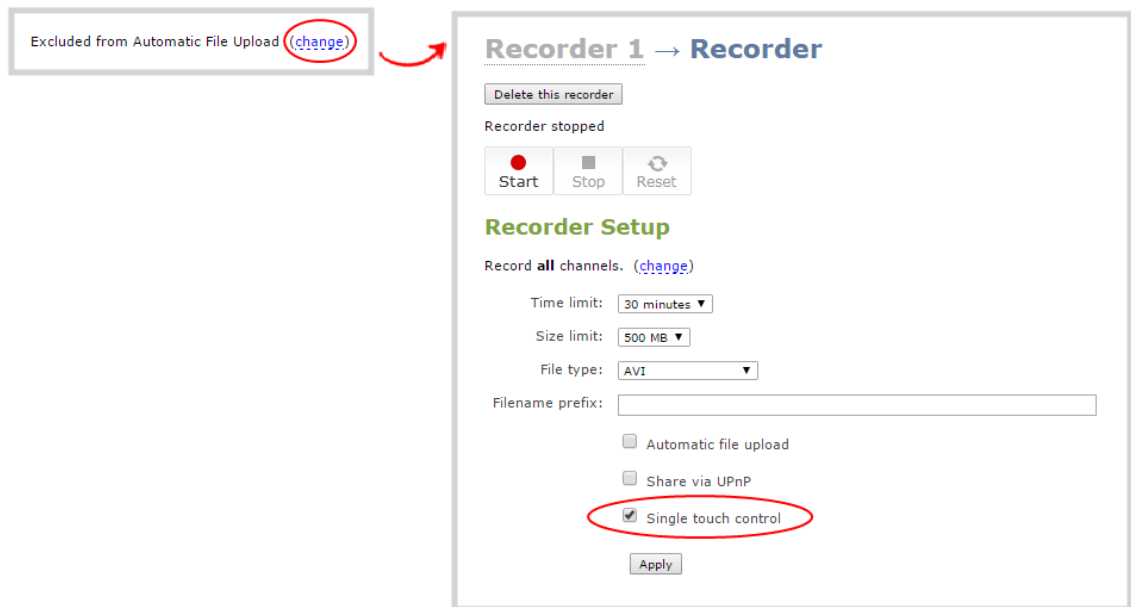
c. Click **Apply**.

To learn how to configure your channels for recording, see **Record**. To learn how to configure recorders, see **Recorders**

Specify channels for One Touch streaming

Channels are not enabled for One Touch streaming by default. You can enable and disable One Touch streaming control for individual channels using the Admin panel.

To specify channels for One Touch streaming:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select the channel you want and click **Streaming**. The Streaming page opens.
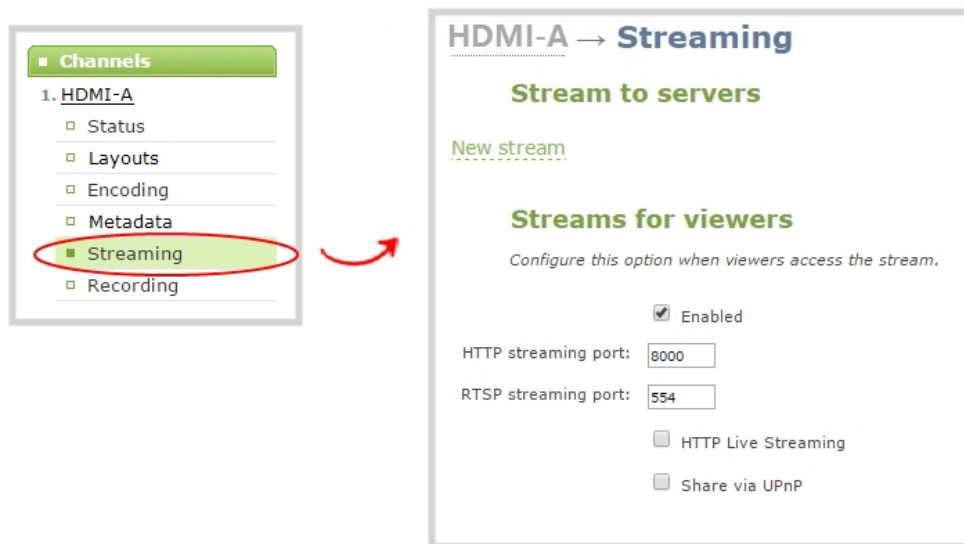
3. Click **New stream** and select a publishing method, for example, RTMP push.

4. Check **Single touch control** to enable this channel's stream for One Touch control. Uncheck **Single touch control** if you don't want to include this channel's stream for One Touch control.
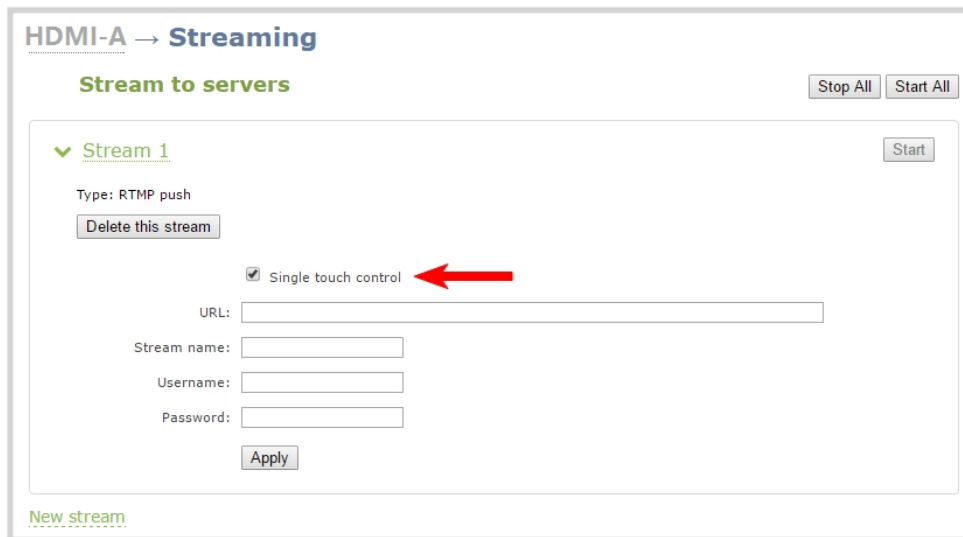
5. Click **Apply**.

> To learn how to configure your channels for streaming, see **Stream**.

Configure the touch screen

The touch screen on Pearl Mini is enabled by default and all its features are available. You can disable the entire screen or some of its features using the Admin panel. For information about how to connect to and use the Admin panel, see The Admin panel.

Topics include:

- Disable or enable the touch screen
- Hide or show channel previews on the touch screen
- Disable or enable the system status screen
- Disable or enable configuration using the touch screen
- Disable or enable recording, streaming and switching from the touch screen
- Set the touch screen timeout
- Set a 4-digit PIN security code

Disable or enable the touch screen

You can enable or disable Pearl Mini from displaying anything on the touch screen. The touch screen remains touch-sensitive even when the display is disabled.

To disable or enable the touch screen display:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Touch Screen**. The touch screen configuration page opens.
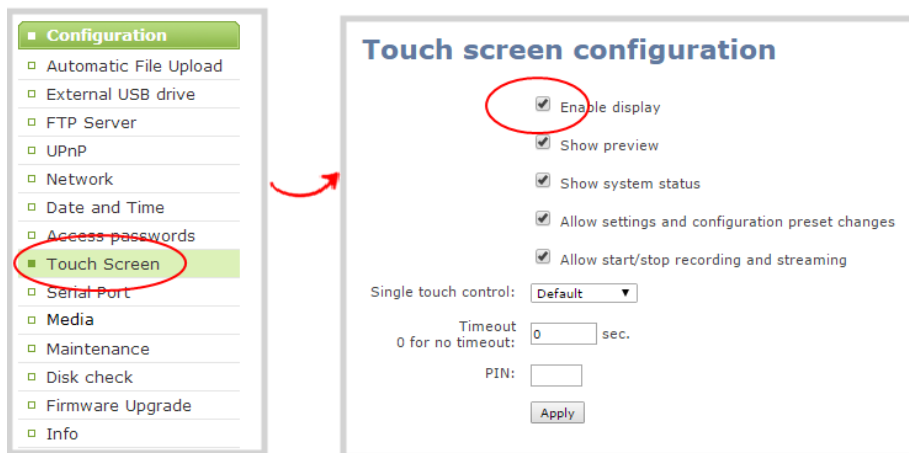
3. Uncheck **Enable display** to disable the touch screen display. Check **Enable display** if you want the touch screen display enabled.

4. Click **Apply**.

Hide or show channel previews on the touch screen

Previews of your configured channels display on the touch screen of Pearl Mini by default. You can disable channel previews using the Admin panel.

A message displays on the touch screen when channel previews are disabled. If you have configured **system status** or **settings and configuration preset changes** to be allowed, then tapping anywhere on the touch screen opens the settings page.
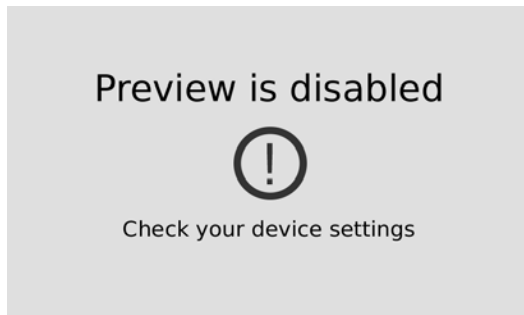
To hide or show the channel previews on the touch screen:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Touch Screen**. The touch screen configuration page opens.
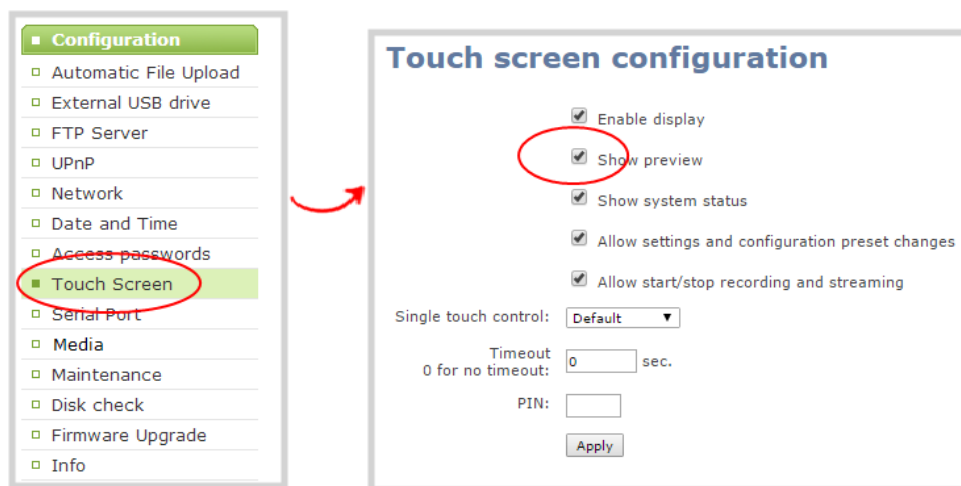
3. Uncheck **Show preview** to disable channel previews from displaying on the touch screen. Check **Show preview** if you want to enable channel previews on the touch screen.

4. Click **Apply**.

Disable or enable the system status screen

The system status screen displays network and system related information, such as the IP address needed to access Pearl Mini. You may not want this information visible on the touch screen after you've configured Pearl Mini. You can use the Admin panel to disable the system status screen from displaying on the touch screen.

To disable or enable the system status screen from displaying on the touch screen:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Touch Screen**. The touch screen configuration page opens.
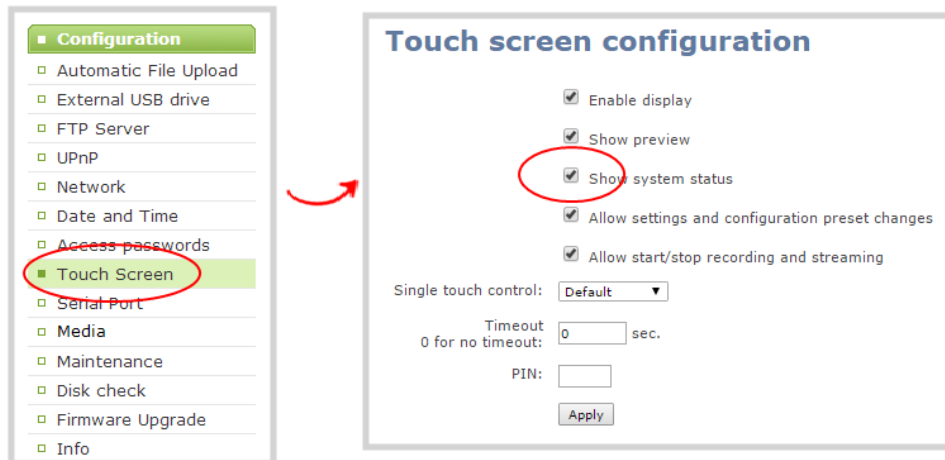
3. Uncheck **Show system status** to prevent the system status screen from opening on the touch screen. Check **Show system status** if you want to enable the system status screen to open on the touch screen.

4. Click **Apply**.

Disable or enable configuration using the touch screen

You can apply configuration presets and configure network settings using the touch screen on Pearl Mini by default. You can disable this ability using the Admin panel.

If configuration is blocked and system status is permitted, touch screen users see an *i* icon instead of the configuration gears icon in the lower right corner of the touch screen.

To disable or enable the channel previews on the touch screen:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. Select the **Touch Screen** link in the Configuration menu; the touch screen configuration page opens.
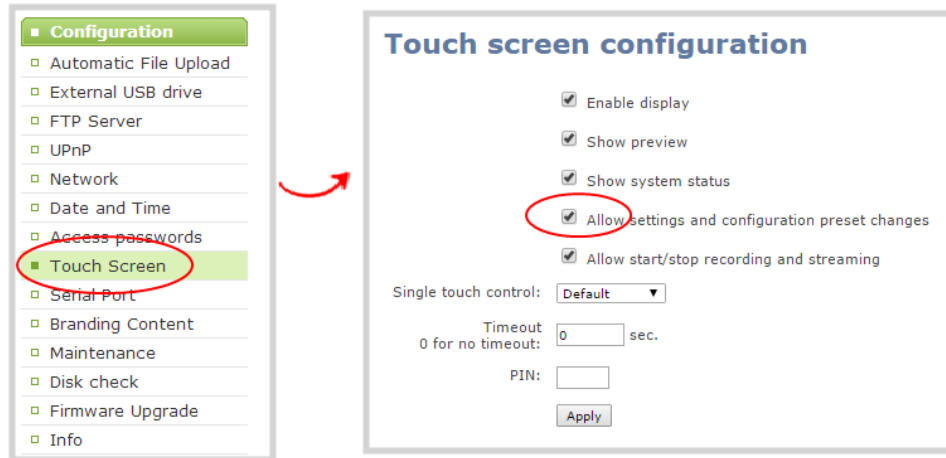
3. Uncheck **Allow settings and configuration preset changes** to disable configuration from the touch screen. Check the check box if you want to enable configuration from the touch screen.

4. Click **Apply**.

Disable or enable recording, streaming and switching from the touch screen

Recording, streaming, and live switching control using the touch screen on Pearl Mini is enabled by default. You can disable this function using the Admin panel to stop users from switching layouts and from starting or stopping live streams and recordings.

Channel preview must be enabled for the touch screen for recording, streaming, and live switching control to work. See **Hide or show channel previews on the touch screen**

To disable or enable recording, streaming, and switching control using the touch screen:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Touch Screen**. The touch screen configuration page opens.
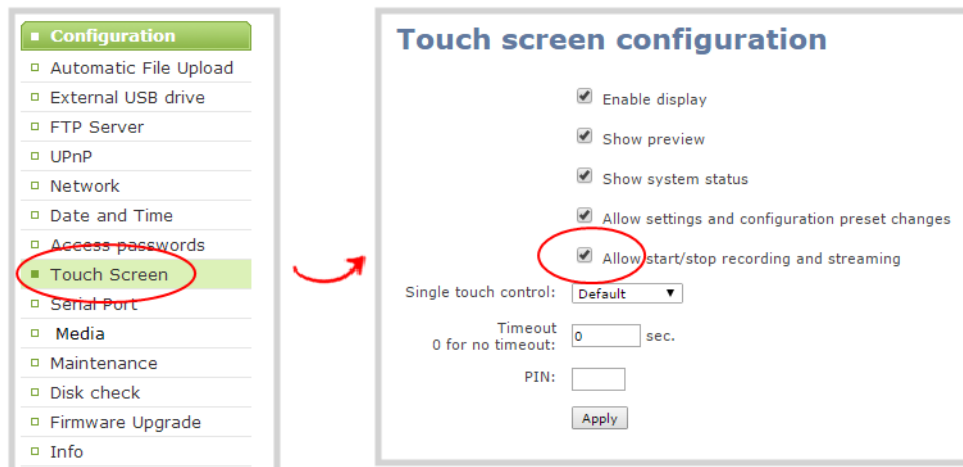
3. Uncheck **Allow start/stop recording and streaming** to disable recording, streaming, and live switching control from the touch screen. Check the check box to enable recording, streaming, and live switching control.

4. Click **Apply**.

Set the touch screen timeout

Initially, the touch screen is always on for easy monitoring. However, you can set the touch screen to shut off after a given amount of time. To re-enable the touch screen after it times out and shuts off, simply tap anywhere on the screen.

To set a timeout for the touch screen:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Touch Screen**. The touch screen configuration page opens.
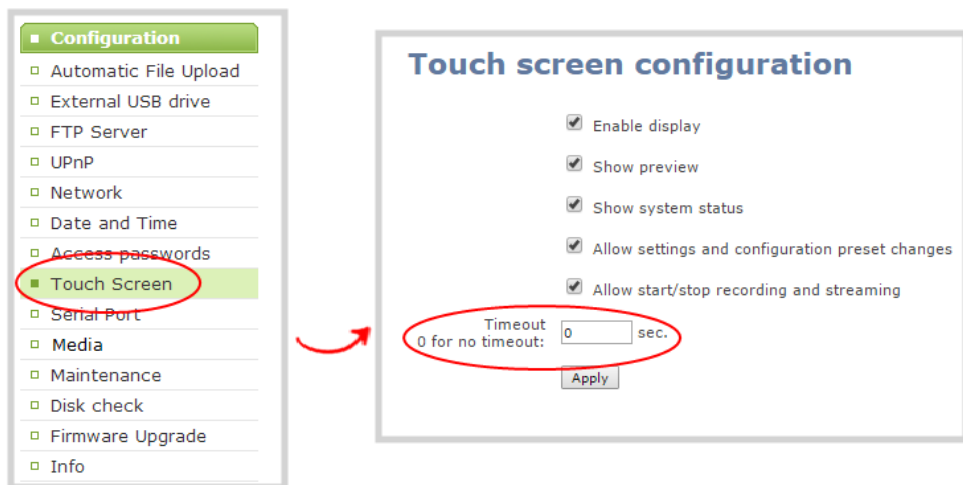
3. Enter the number of seconds before the touch screen automatically shuts off in the **Timeout** field. A value of 0 keeps the touch screen on at all times when the system is on.

4. Click **Apply**.

Set a 4-digit PIN security code

You can set a 4-digit PIN code to protect the touch screen of Pearl Mini from unauthorized access. By default, the PIN is not set.

If a PIN is configured, users are prompted to enter the PIN code whenever:

- When you power on or restart Pearl Mini.
- When Pearl Mini recovers from timeout mode, see Set the touch screen timeout.
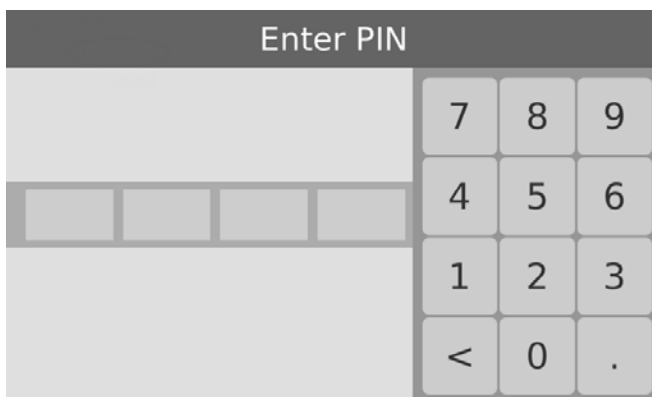
To configure a 4-digit PIN code:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Touch Screen**. The touch screen configuration page opens.
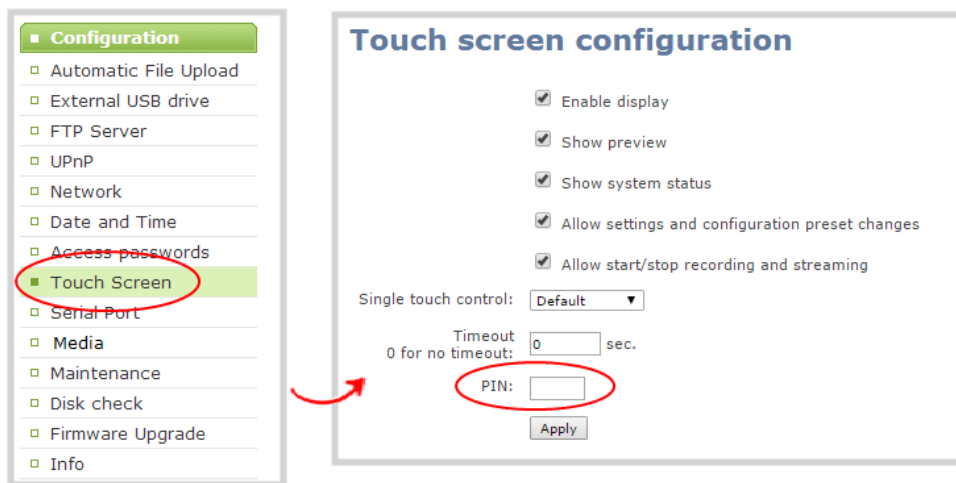
3. Enter a 4-digit PIN code in the **PIN** field.

> Record the PIN code in a safe location for future reference. You need this PIN to access the touch screen of your Pearl Mini.

4. Click **Apply**.

The Admin panel

The Admin panel is used primarily to set up your Pearl Mini and perform administrative tasks. Most tasks in this user guide are performed using the Admin panel.This section contains what you need to get started using the Admin panel.

Topics include:

- About the Admin panel
- Connect to the Admin panel
- Connect using a DNS-based service discovery
- Connect using the Epiphan discovery utility
- Connect using persistent static IP address

About the Admin panel

The Admin panel is a web-based user interface that's used primarily to set up your Pearl Mini and perform administrative tasks.
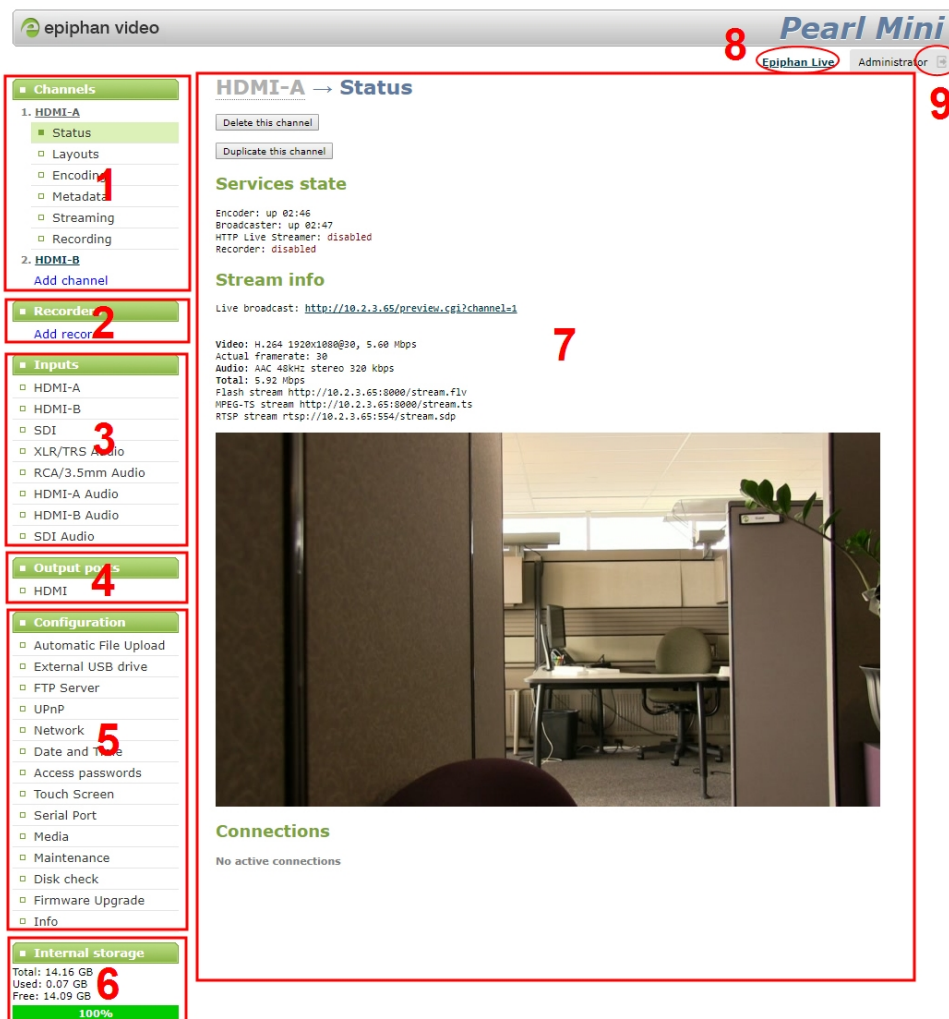
Table 8 *The Admin panel*

Label	Name	Description
1	**Channels menu**	The channels that are available for the current configuration of your Pearl Mini are listed. Select a channel to access the drop down list of options that are available to configure channel encoding, add video and audio source, create layouts, perform confidence monitoring, record the channel, and more.
2	**Recorders menu**	Recorders you add to your Pearl Mini are listed. Select a recorder to open the status page and list of related recordings for that recorder. You can start and stop recording, as well as configure the recorder settings from this page.

Label	Name	Description
3	**Inputs menu**	The available video and audio input ports on your Pearl Mini are listed. Select a port to open the configuration and status page for that port.
4	**Output ports menu**	The output ports available on your Pearl Mini are listed. Select a port to open the configuration and status page for that port.
5	**Configuration menu**	A list of all the available configuration options.
6	**Internal storage and system information menu**	System details are displayed in this area, such as the total amount of internal storage, how much space is currently used, and how much free space is available.
7	**Main panel**	The main panel is where the all the related information displays. What gets displayed in the main panel depends on which menu item you select.
8	**Link to Epiphan Live**	Click to open Epiphan Live in a new tab.
9	**Log out**	Click to log out of Pearl Mini. Click icon again to display the log in window. The role of the currently logged in user displays beside the icon.

Connect to the Admin panel

You can access the Admin panel using an internet browser on a computer or tablet that's connected to the same local Ethernet network as your Pearl Mini. You need the IP address of the system, which you can get from the settings using the front touch screen of your Pearl Mini. Using the touch screen is the easiest way to find the IP address of your system.

There are two ways to get the IP address using the touch screen to log in to the Admin panel:

1. Get the IP address of Pearl Mini. Do one of the following:

   a. From a single channel view or grid view, tap the system settings (**gears**) icon, then tap **System Status**, or

   b. If your system doesn't have any channels showing, tap the touch screen anywhere to go to the

system settings screen, then tap **System Status**.
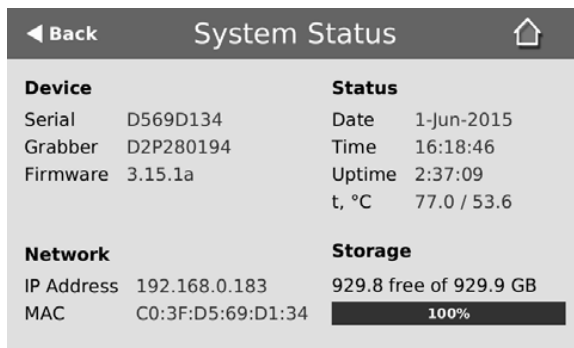
3. When you have the IP address of your Pearl Mini, enter the following into the address bar of your web browser to launch the Admin panel.

> http://<IP Address of Pearl Mini>/admin

4. Enter your user name and password when prompted. The administrative user name is **admin**. Initially no password is set so you can leave that blank and click **OK**.

> To set a password, follow the procedure outlined in **User administration**.

If you don't know the IP address, you can do one of the following:

For networks with DHCP, you can:

- Connect using a DNS-based service discovery
- Connect using the Epiphan discovery utility

For networks without DHCP, you can:

- Connect using persistent static IP address

Connect using the Epiphan discovery utility

Epiphan provides a utility for discovering Epiphan systems on your network. The Epiphan network discovery utility is a 32-bit Windows executable that works on most 32-bit and 64-bit Windows operating systems. Download and install the utility via this link: https://www.epiphan.com/downloads/NetworkDiscovery.exe.

To access the Admin panel using the Epiphan discovery utility:

1. Launch the discovery utility.

2. Click **Search** to find all the Epiphan systems on the network. A list similar to the following appears.
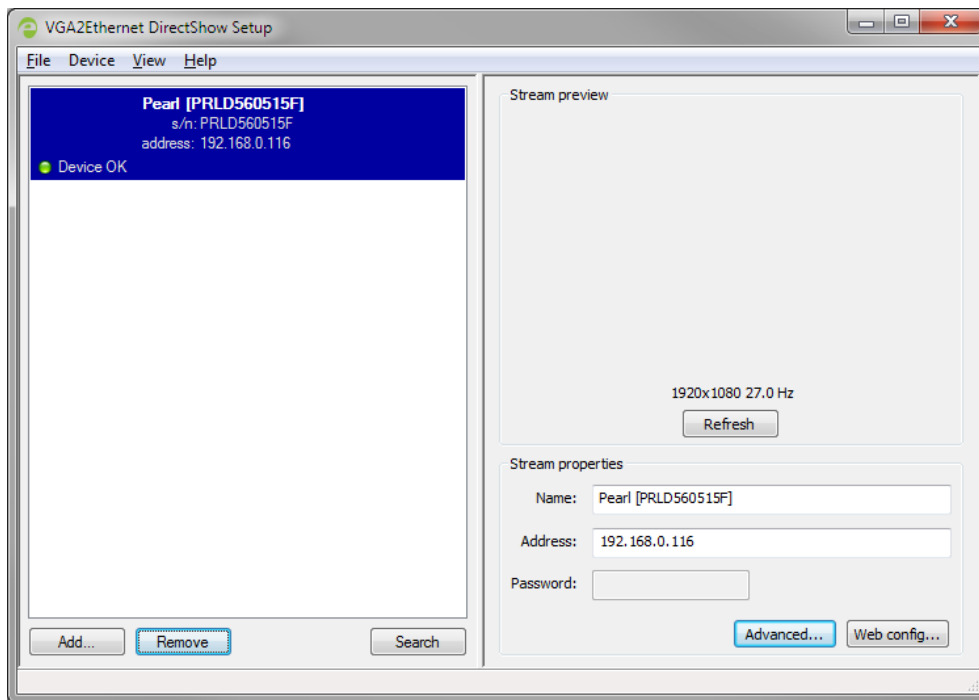
> If more than one Pearl Mini appears, select the one you want using the serial number that's listed.

3. (Optional) Record the **IP Address** shown in the stream properties for future reference.

4. Click **Web config**. Your browser opens and points to the Admin panel page, for example: http://<*IP Address of Pearl Mini*>/admin

5. Enter your user name and password when prompted, then click **OK**. The administrative user name is **admin**. Initially no password is set. To set a password, see User administration.
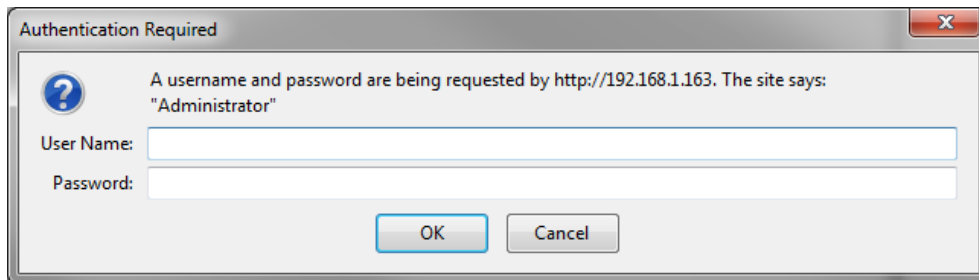
Connect using a DNS-based service discovery

Pearl Mini uses DNS-based messages to advertise details about itself, including its host name. With a compatible utility installed on your computer, you can access the system simply by typing its serial number and the suffix ".local" into the address bar of your browser.

The following table lists the compatible systems and Bonjour Print Services software needed.

Table 9 *Install Bonjour Print Services*

System	Action Needed
Microsoft Windows	You must install Bonjour Print Services: 1. Use the following URL http://support.apple.com/kb/DL999 2. Click Download. 3. Follow the system prompts to download and install the application.
Mac OS X	The Bonjour software used for service discovery is built into the Mac OS. No special actions are needed.
Linux	The Avahi implementation used for DNS-based discovery is shipped with most Linux distributions. If necessary, check with your administrator to ensure you have the Avahi package installed.

To access the Admin panel of Pearl Mini using DNS discovery:

1. Find the system's serial number that's printed on a label attached to the device.

   TIP: The serial number also appears on the System information screen from the touch screen of Pearl Mini. Tap the system information gear icon to display the System information screen. If needed, tap the screen once to display the control icons.

2. Enter the following string into the address bar of your web browser on your admin computer, where *<serial>* is the serial number of your Pearl Mini:

   http://*<serial>*.local/admin

   For example: http://95dd40d5.local/admin

3. Enter your user name and password when prompted, then click **OK**. The administrative user name is **admin**. Initially no password is set. To set a password, see User administration.
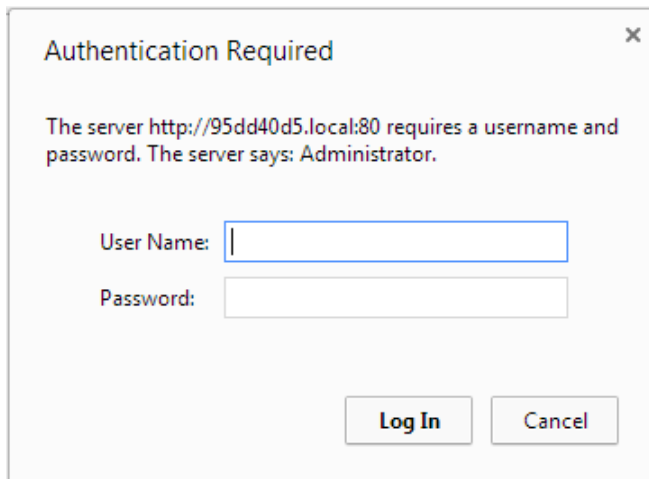
4. (Optional) From the Configuration menu, click **Network** and note the **IP address** of the system from the network configuration page.

Connect using persistent static IP address

Pearl Mini has a default persistent static IP address, also known as the **recovery IP address**. If ever you need to set up Pearl Mini on a network that does not support DHCP, or you need to recover from a previous static IP address setting, you can use this procedure to connect directly to the system for configuration.

A workstation computer with access rights to modify your network settings is required.

Pearl Mini static IP address defaults are:

- **IP Address**:   192.168.255.250
- **Netmask**:   255.255.255.252
- **Username**:   admin
- **Password**:   your admin password (by default set to no password)

To access the Admin panel using the persistent static IP address:

1. Establish an Ethernet connection between Pearl Mini and the workstation using one of the following methods:

    a. Connect Pearl Mini to a local Ethernet network shared with the workstation.

    b. Connect Pearl Mini directly to the workstation's Ethernet port using either a regular or a crossover Ethernet cable.

2. Record the network settings of the workstation that are used to connect to Pearl Mini so that they can be restored later.

3. Temporarily change the network configuration on the workstation to the following:

    a. Use Static IP assignment

    b. IP address: 192.168.255.249

    c. Subnet mask: 255.255.255.252

4. Start a web browser on the workstation and go to: **http://192.168.255.250/admin/**

5. Log in as the administrator user with the user name **admin** and enter the admin password (by default there is no password assigned). The Admin panel opens.

6. From the Configuration menu, click **Networking**.

7. Click **use a static address** and enter a static IP address and network settings you want for Pearl Mini. For more information, see Configure network settings.

8. Restore the previously saved network configurations on the workstation.

Switching / mixing using the Admin panel

Switching live video inputs, or video mixing, is fast and easy using the Admin panel. For best results, you may wish to be in a location where you can see the live action, and have a solid understanding idea of what is in each of your layouts. Good layout names can help with this. See Rename a layout.

> Performing live switching using one interface, like the Admin panel, does not dynamically update the visuals in the other interfaces (e.g. the touch screen and Epiphan Live). The other interfaces must be manually refreshed to accurately reflect the current live switching layout information.

To do live video mixing:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The layout editor page opens.

3. In the layouts list, the layout with the big red circle beside it is the currently chosen "live" layout.

4. To switch to a different layout as the active "live" layout, click the gray circle beside the layout you want
    to make go live. The circle turns red to indicate that it's now the active "live" layout.

Epiphan Live

Epiphan Live is a friendly and easy to use web and tablet interface designed for confidence monitoring of channels and sources, switching between layouts while recording and streaming, and to easily stop or start streaming and recording.

Topics include:

- About Epiphan Live
- The Dashboard interface
- Access Epiphan Live using a web browser or mobile device
- Access Epiphan Live from the Admin panel
- Stream, record, and monitor using the Dashboard interface
- Switching / mixing using Epiphan Live
- Your recordings

About Epiphan Live

The Epiphan Live interface lets you easily operate your Pearl Mini using a computer or mobile device such as a tablet. You can:

- Control streaming and recording of channels and recorders.
- Do live switching between sources and layouts while streaming and recording.
- Perform video, audio and system confidence monitoring.

You need administrator or operator-level privileges to use Epiphan Live. See User administration for more information about user privileges.

Epiphan Live is supported on the following operating systems on mobile devices and web browsers:

Operating system or mobile device	Supported web browser(s)
Windows	• Google Chrome • Microsoft Edge
Mac	• Google Chrome • Safari
Linux	• Google Chrome
Android phone or tablet	• Google Chrome
iPhone or iPad	• Google Chrome • Safari

Most instructions assume that a touch screen device is used; however, you can tap or click, depending on your device.

Text scaling using Google Chrome for Android is not supported.

The Dashboard interface

The Dashboard interface is the first page you see when you open Epiphan Live. You'll find helpful tools for confidence monitoring, as well as streaming and recording control.
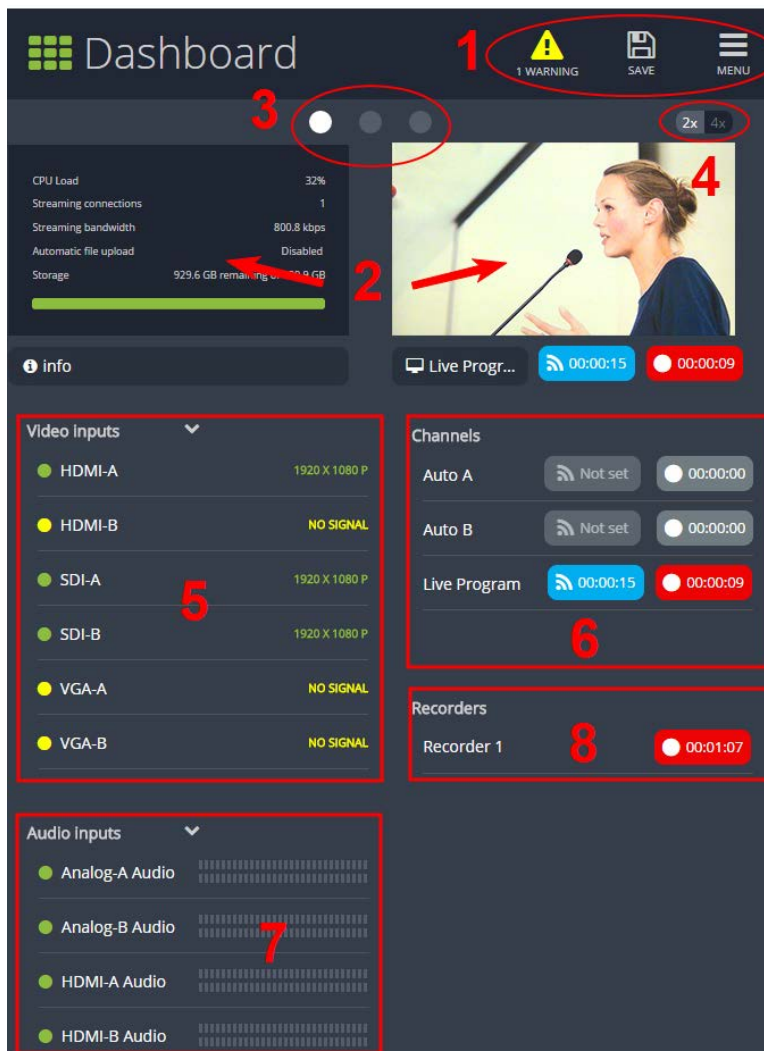
Table 10 *Elements in the Dashboard interface*

Number	Title	Description
1	**Dashboard header icons**	• **Warning** – This icon displays only if there are any configuration errors in your channels, sources, streams or recordings. Clicking the icon displays more detail about the errors. • **Save** – Save the current Dashboard layout. ⬛ Tap **Save** to preserve the current layout. Logged in operators and administrators will see the

Number	Title	Description
		latest Dashboard layout when they refresh their Epiphan Live page. The latest saved layout displays the next time you log in. • **Menu** – Access links to the Switcher view, Recordings, and Admin panel.
2	**Dashboard monitoring panels**	Configurable panels for confidence monitoring. You can set each panel to display a source, channel, output, or basic system information. Panels are empty by default.
3	**Dashboard panel navigation icons**	Each dot represents a set of panels. Select a dot to navigate between the three different sets of Dashboard monitoring panels.
4	**Dashboard panel set quantity icons**	• **2x** – Changes the quantity of Dashboard panels per set to 2 (as in the screen shot above). • **4x** – Changes the quantity of Dashboard panels per set to 4.
5	**Video inputs**	Displays a list of your video inputs configured in the Admin panel and includes basic status information for each input.
6	**Channels**	Displays a list of your channels configured in the Admin panel and includes streaming and recording control buttons for each channel, as well as individual control buttons for each stream when you set up multiple streams in a channel.
7	**Audio inputs**	Displays a list of your audio inputs configured in the Admin panel. Includes basic status information and a VU meter for each input.
8	**Recorders**	Displays a list of your recorders configured in the Admin panel and includes a recording control button for each recorder.

Access Epiphan Live using a web browser or mobile device

You can open Epiphan Live using a web browser on your Windows, Mac, or Linux computer. You can also use Epiphan Live on an Android phone or tablet, an iPhone, or an iPad.

You need the IP address of your Pearl Mini to connect to Epiphan Live, see Connect to the Admin panel.

1. Enter the following into the address bar of your web browser.

    a. For a web browser on a computer, enter:

    > http://<IP address of your Pearl Mini>/admin/m

    b. For a web browser on a mobile device, enter:

    > http://<IP address of your Pearl Mini>

2. Enter your administrator or operator credentials when prompted.

> If you're using the Chrome browser on an HTTPs network and your website has an insecure or invalid security certificate, you can't preview any channels using the Dashboard even after updating the security certificate in Chrome. Use a different web browser instead, such as Firefox, and add the security certificate for the website to the exceptions list.

Access Epiphan Live from the Admin panel

You need the IP address of your Pearl Mini to log in to the Admin panel for this procedure, see Connect to the Admin panel.

1. Log in to the Admin panel using your credentials. In your web browser, enter:

> http://<IP address of your Pearl Mini>

2. Click **Epiphan Live** in the upper-right corner of the Status page. The Epiphan Live dashboard opens in a new tab.

To open the Admin panel from Epiphan Live, click the **Menu** icon in the upper-right corner of the Dashboard or Switcher interface, and then click **Admin panel**.
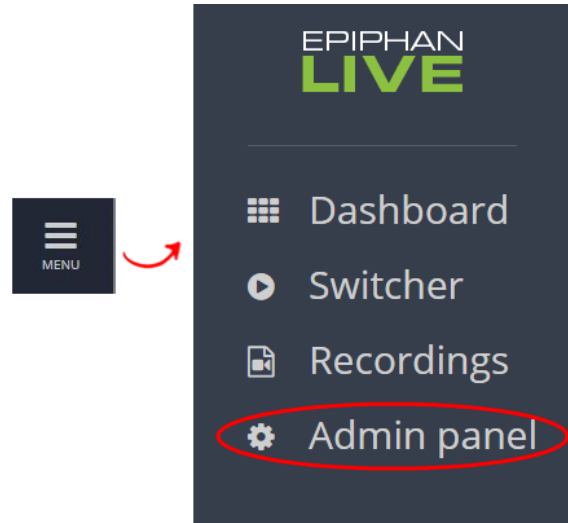
Stream, record, and monitor using the Dashboard interface

The Dashboard interface in Epiphan Live is where you can do confidence monitoring, as well as start and stop streaming and recording for your channels.

Topics include:

- Configure Dashboard panels

- Monitor video and audio input sources

- Monitor and setup the output port source and audio

- Control streaming and recording

Configure Dashboard panels

You can customize each Dashboard panel to display a specific channel, input source, or video output for live confidence monitoring. Panels can also be set up to display system information:

- CPU load (%)

- Quantity of streaming connections

- The current streaming bandwidth (bitrate)

- Automatic file upload status (enabled or disabled). See File and recording transfer.

- Storage available on your Pearl Mini.

Other logged in operators and admins must refresh their web browsers to see the latest changes to the Dashboard.

> **[STOP]** Up to 8 Epiphan Live preview panels can be open at the same time. The limit of 8 live preview panels applies **across all open instances of Epiphan Live**, including multiple users accessing Epiphan Live simultaneously from different web browsers, or duplicate instances of the same Epiphan Live interface open on multiple browser tabs at the same time.

To configure Dashboard panels:

1. Log in to Epiphan Live (see Access Epiphan Live using a web browser or mobile device).

2. Tap the drop down menu that appears below the panel and select the channel, source, or output to display. The label says "None" if the panel is not yet configured.
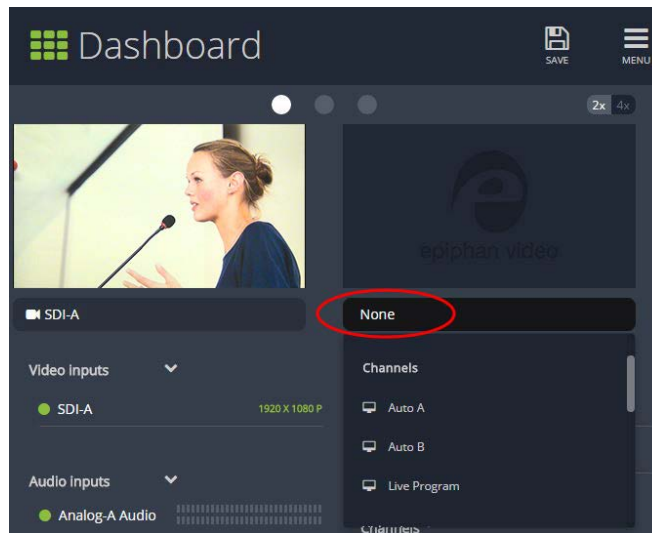
> **[note]** When a channel is selected, streaming and recording control buttons appear below the panel. You can control streaming and recording of that channel using those buttons.

3. (Optional) To choose between displaying 2 or 4 panels, tap the **2x|4x** icon that appears in the upper-right corner of the panels area.

4. Tap **Save**.
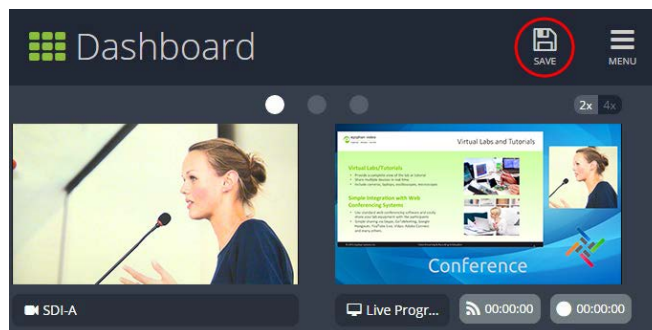
> You can navigate between 3 separate sets of Dashboard panels by selecting the **circle icons** along the top of the first row of panels.

Monitor video and audio input sources

Use the Dashboard to monitor your video and audio inputs. The video inputs section of the Dashboard lists all inputs configured on your Pearl Mini and displays the video resolution.
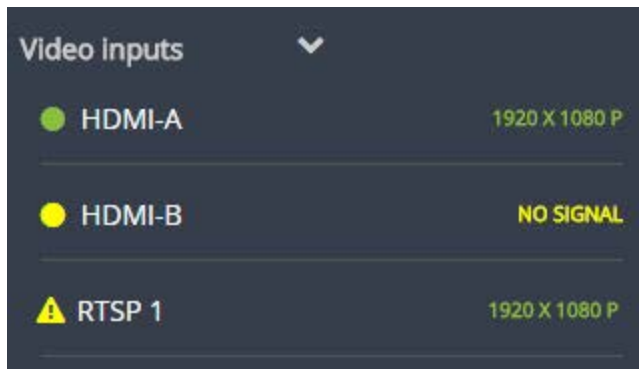
- A **green dot** means that the video source is connected and a signal is received.
- A **yellow dot** means that a signal is not being receiving from the source.
- A **triangular warning icon** means there is a source configuration issue that needs attention.

Tap **the name of a video input** to open the source details in a thumbnail view, including warning information if applicable.

The audio inputs configured on your Pearl Mini appear in the Audio inputs section of the Dashboard.
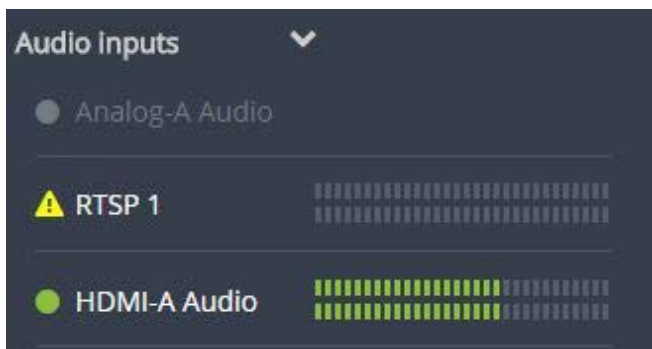
- A **grayed-out audio source** means that the audio source is not used in any channels.
- A **triangular warning icon** means there is a source configuration issue that needs attention. Click the

audio source name to display the warning message.

- A **green dot** means the source is connected and the accompanying VU meter shows the audio level.

The audio VU meter uses quasi-peak ballistics with samples averaged every 10 ms. The maximum average in each 100 ms period is displayed as a series of colored bars. The following table describes the levels at which the meter changes from green to yellow and red.

Table 11 *Audio VU meter levels*

Color	Decibel range
Red	0 to -9 dBFS
Yellow	-9 to -18 dBFS
Green	-18 dBFS and lower

Show or hide video inputs in the list

You can pick which video inputs display in the Dashboard view. Just tap the **Video inputs** header and then check the **checkbox** next to the name of each source you want showing in the Dashboard view. Tap **Save** when you're done. The Dashboard video input list updates automatically.
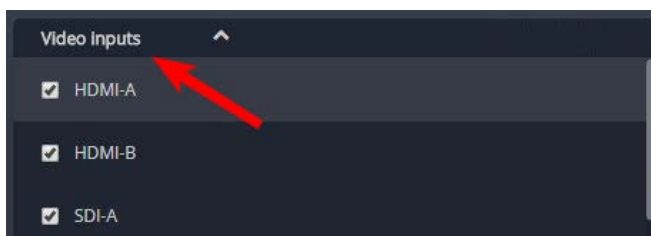
Show or hide audio inputs

You can pick which audio inputs display in the Dashboard view. Just tap the **Audio inputs** header and then check the **checkbox** next to the name of each source you want showing in the Dashboard view. Tap **Save** when you're done. The Dashboard audio input list updates automatically.
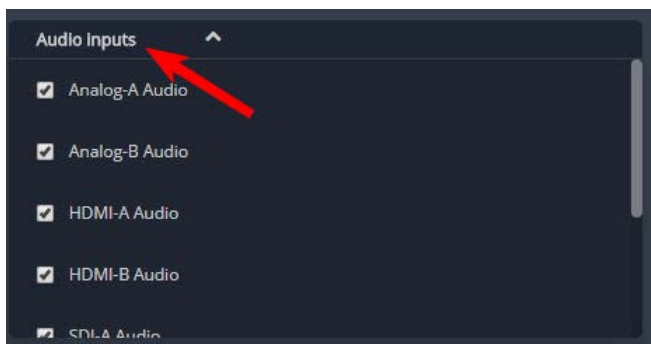
Monitor and setup the output port source and audio

The Dashboard lists the output ports along with the resolution and frame rate. You can enable and disable a video output port, as well as choose if you want to display a channel or a video source. You can also enable or disable the audio volume for the output port. However, you cannot hide video output ports from displaying on the Dashboard.

To configure the output port audio using the Admin panel, see Disable or enable audio and output port volume.
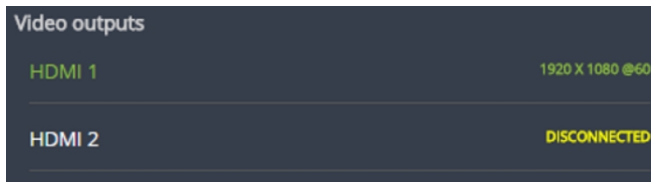
- **Green text** means your output is connected and transmitting to your external display.
- **Grayed-out text** means the output port is disabled.
- **White text** means the output port is enabled but is not connected to an external display.

Click **the name of a video output** to open the port's details in a thumbnail view.

> By default, video output ports are configured to maintain aspect ratio, use the display's default resolution, include audio at 100% and they don't include the audio VU meter. You can change these defaults in the Admin panel. See **Video output ports** to learn more about advanced-level video output configuration using the Admin panel.

To configure a video output port and enable or disable the audio:

1. Tap **Video outputs** to display the video output configuration menu.
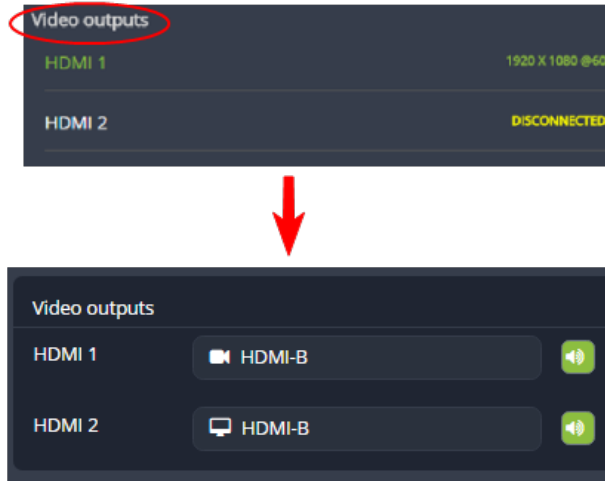
2. Tap the **text field beside the output port** and select a channel or source from the list.
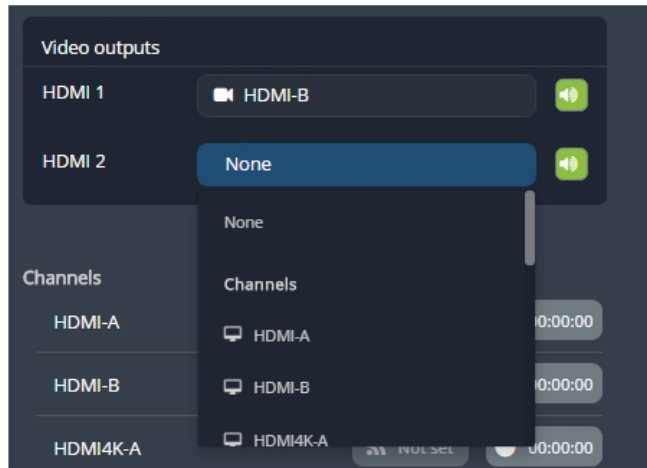
3. To enable or disable audio for the output port, tap the **speaker icon** to toggle audio On and Off for the port. A green icon means audio is enabled. A gray icon means audio is disabled.
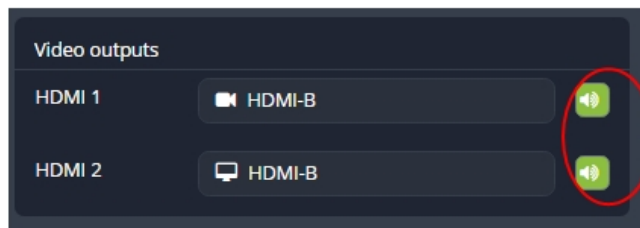
Control streaming and recording

From the Epiphan Live Dashboard, you can control streaming and recording for channels using the buttons in the **Channels** section. When a channel is not currently streaming or recording, the buttons are gray and their respective timers are set to 00:00:00. If streaming isn't configured for a channel, the streaming button displays as "Not set". See Streaming a channel directly to viewers to learn how to configure streaming for a channel using the Admin panel.

- The left-most button with the "signal" icon starts and stops streaming for the channel.
- The right-most button with the circle icon starts and stops recording for the channel.
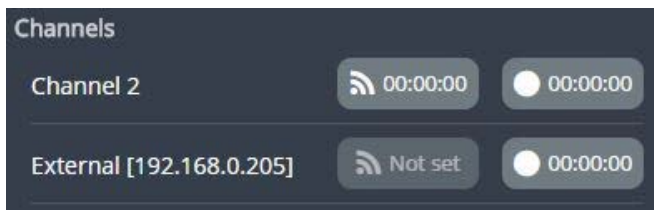
If multiple streams are configured for a channel, a pair of control buttons is displayed for each stream.

Click the channel name to open a preview thumbnail view.
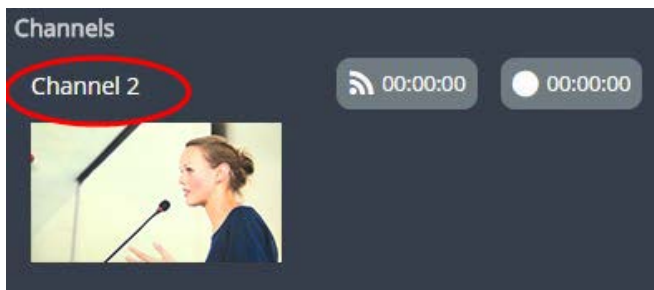
When you're ready to start streaming and recording the channel, tap the streaming and recording control buttons. Tap the buttons a second time to stop streaming and recording.

- The streaming button turns blue when the channel is streaming and the timer's clock increments.
- The recording button turns red when the channel is recording and the timer's clock increments.
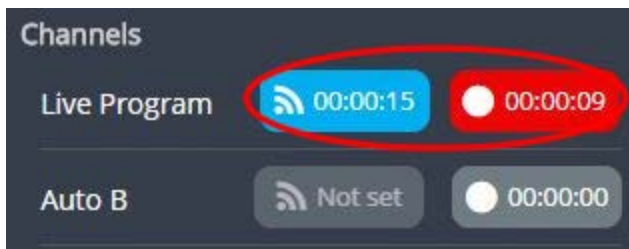
Streaming and recording control buttons also appear below the Dashboard monitoring panels when they're configure to display a channel. You can use those control buttons to start and stop streaming or recording for a channel too.
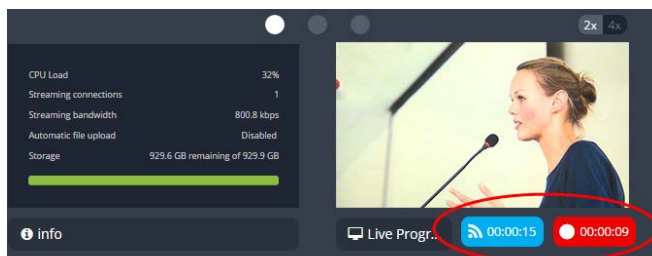
If the stream fails to publish, the streaming button flashes blue and displays "ERROR". Check the streaming settings for your channel using the Admin panel, see Streaming a channel directly to viewers.

Recording using multi-track recorders

From the Admin panel, you can create multi-track Recorders to capture multiple channels and audio sources in a single recording. You can then select which combination of video and audio sources to extract from the recording. This feature is useful when you're capturing a video source and multiple languages from different audio sources. Multi-track recorders appear on the Dashboard if they are configured on your Pearl Mini.

Each multi-track recorder has a recording control button to start and stop recording. When a Recorder is not recording, the button is gray and the timer is set to 00:00:00. See Add a recorder to learn more about configuring multi-track recorders using the Admin panel.
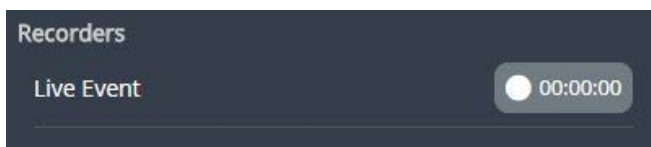
To start recording, simply tap the recording control button for that multi-track recorder. The button turns red when the multi-track recorder is recording and the timer's counter increments. Tap the button a second time to stop recording.
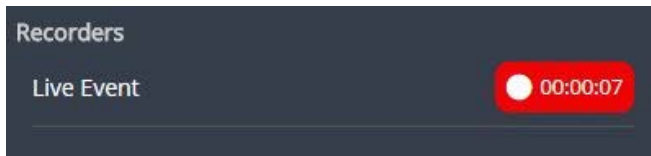
Switching / mixing using Epiphan Live

The Live Switcher view in Epiphan Live is a simple interface that lets you live switch between layouts while streaming and recording. To learn how to create different layouts for a channel using the Admin panel, see Add or edit a custom layout.

> Switching between layouts using one of the switcher interfaces, such as the touch screen, does not dynamically update what you see in the other switching interfaces (i.e. Epiphan Live and the Admin Panel). You must manually refresh the other interfaces separately to reflect the current state.

Topics include:

- About the Switcher interface
- Switching / mixing using Epiphan Live
- Switching / mixing using the touch screen
- Switching / mixing using the Admin panel

About the Switcher interface

The Switcher interface is accessed from the Menu button in the top right corner of the Dashboard interface. See The Dashboard interface.
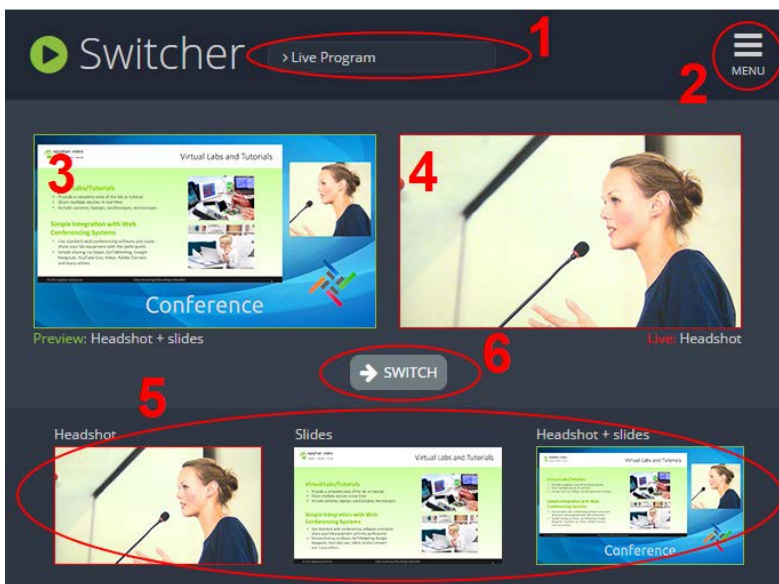
Table 12 *Elements in the Switcher view*

Number	Title	Description
1	**Channel selector**	A list of channels configured on your Pearl Mini. When a channel is selected, you can switch between the different layouts that are configured for that channel.
2	**Menu icon**	Displays links to the Dashboard view and the Admin panel when clicked.
3	**Preview panel**	Displays a preview of a selected layout, which is outlined with a green border. When you click the **Switch** button, this preview layout becomes the live layout. See Switching while live streaming and recording using Epiphan Live for more information.
4	**Live view panel**	Displays the active "live" layout that is currently being streamed or recorded. The live layout is outlined with a red border. When you select the **Switch** button, this live layout is replaced with the layout that's loaded in to the **Preview panel**.
5	**Layout carousel**	Displays small previews for all layouts contained within your selected channel. Select a layout from the carousel to add it to the **Preview panel**. Note that the layout selected for the **Preview panel** has a green border and the layout in the **Live panel** has a red border.

Number	Title	Description
6	**Switch button**	When selected, the layout in the **Preview panel** replaces the layout in the **Live panel** and is immediately reflected in your active stream and recordings.

Switching while live streaming and recording using Epiphan Live

The Switcher interface lets you easily live switch between custom layouts with the simple press of a button.

To switch layouts while live streaming and recording:

1. Log in to Epiphan Live. The Dashboard view opens by default. See Access Epiphan Live using a web browser or mobile device.

2. Tap the **Menu** icon in the upper-right corner of the Dashboard screen and tap **Switcher** to open the Switcher interface.
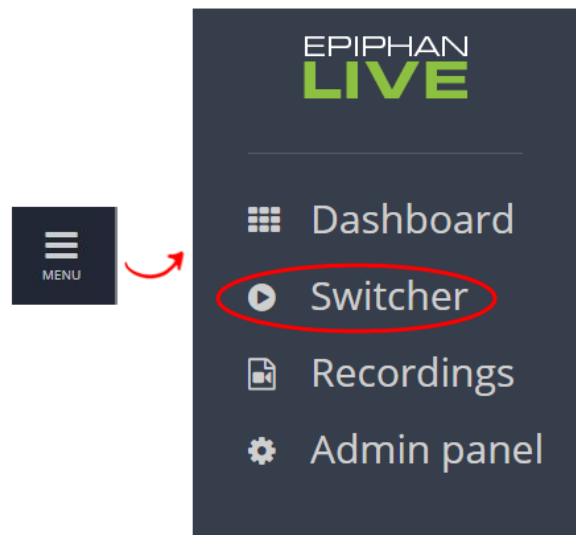
3. Tap the **field** beside the "Switcher" header and select a channel. The field is blank if this is your first time configuring the Switcher. Channels with only one layout are grayed-out and cannot be selected for switching.
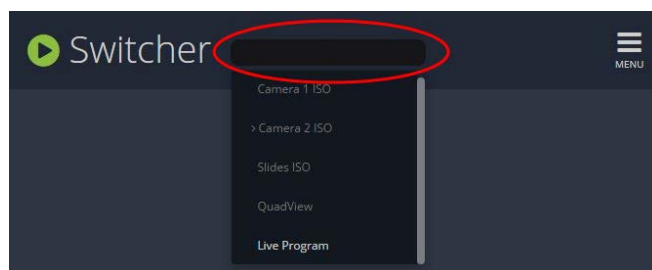
All the layouts for the selected channel are displayed in a carousel along the bottom of the screen. The layout that is live is displayed in the **Live panel** on the right side of the interface, see About the Switcher interface.
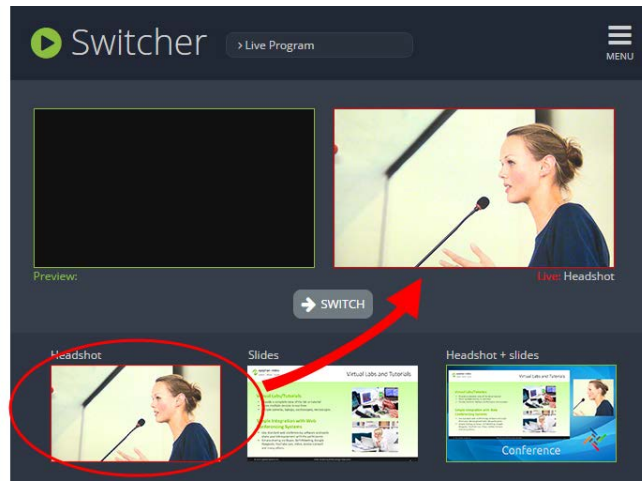
4. In the carousel, tap the layout that you want to switch to next. That layout displays in the **Preview panel**.
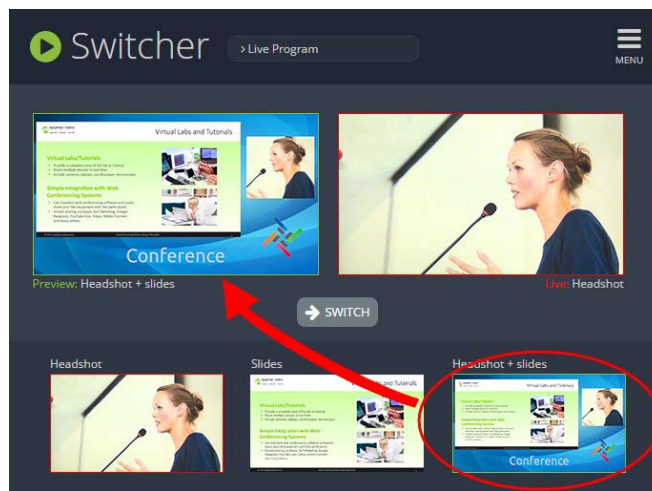
5. Tap the **Switch** button to move the layout that is currently in the **Preview panel** to the **Live panel**. Load another layout into the Preview panel so that it's ready to go live the next time you tap **Switch**.
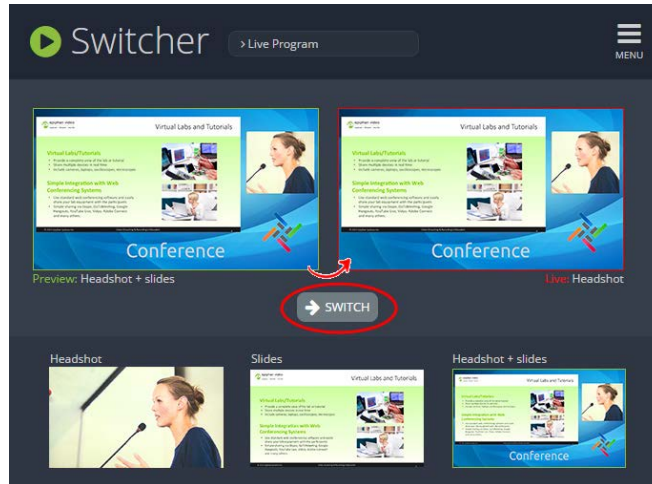
Your recordings

All recordings made using Epiphan Live are saved to the **Your recordings** panel.
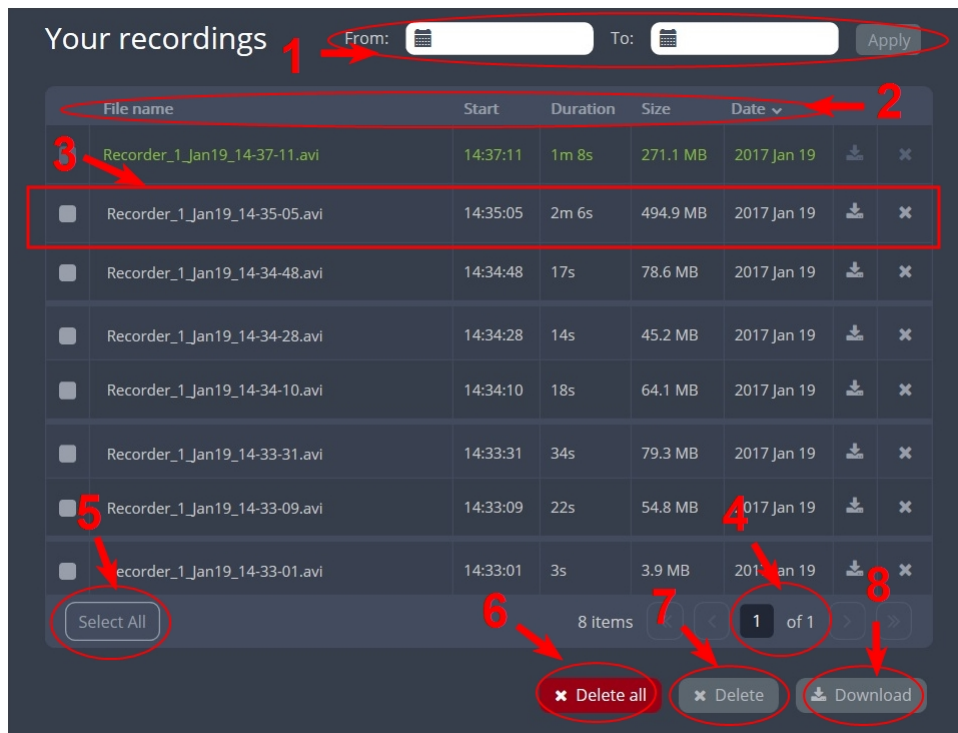
After recoding a file, you can manage it and any other files using the following tools on the page:

Number	Title	Description
1	**Date selector**	Select a **From** and a **To** date from the pop-up calendar to create a date range. Then tap **Apply**. Only recordings that were recorded within that time frame appear in the list below.
2	**File details**	Each heading in the list gives information about that category. Selecting **Date** organizes the list chronologically by the date the recording began.
3	**Files**	Each recorded file that falls within the search parameters appears in this list, including important metadata about the file. Tap or click on the file selects it so that it can be managed through the other tools on the page. You may also download or delete an individual file by using the action items at the end of the file line. Tap the file name to rename the file.
4	**Page indicators**	The page number indicates which page of results you are currently viewing, and how many pages of results are there. The buttons allow you to move between pages one at a time, or straight to the beginning or end of the list. You can also change which page you are on by typing a valid page number into the text box.
5	**Select all**	Tap to select all files on the page.
6	**Delete all**	Tap to delete all files on the list. **Warning**: Deleted files can not be recovered.
7	**Delete**	Tap to delete all selected files. **Warning**: Deleted files can not be recovered.
8	**Download**	Click this button to download all selected files to your local hard drive.

PART 1: Setup

This section contains tasks that are needed to get your Pearl Mini configured to connect to your local network, make system settings, add passwords, make backups of your configuration, and covers how to access status information and monitor the performance of your Pearl Mini.

Topics include:

- Configure network settings
- Configure date and time
- Format the SD card
- Audio input ports
- Video output ports
- Configuration presets
- User administration
- Status and monitoring

Configure network settings

Pearl Mini uses DHCP to obtain an IP Address over an Ethernet-based network by default; however, you can easily change the network settings.

Topics include:

- Network ports used by Pearl Mini
- Verify IP address and MAC address of Pearl Mini
- Configure a static IP address
- Configure DHCP
- Tether to a mobile network
- Perform network diagnostics

Network ports used by Pearl Mini

The following table lists the default incoming and outgoing network ports that Pearl Mini uses.

Do not block traffic over these ports. If you want Pearl Mini to operate properly, make sure that your firewall is configured to open these ports. Blocking a port will cause the service that uses that port to fail. It is possible to use the Admin panel to change the default ports that are used for some services.

Table 13 *Default incoming network ports for Pearl Mini*

Port (or range)	Protocol	Description
21	TCP	FTP server, if enabled. See Local FTP server.
22	TCP	SSH for remote support. See Configure remote support.
80	TCP	Reserved.
123	TCP/UDP	NTP server, if enabled. See Configure a time server.
319 and 320	UDP	PTP server, if enabled. See Configure a time server.
443	TCP	HTTPS for the Admin panel, HLS streaming if enabled.
554 to 554+(x-1)	TCP	For RTSP/TCP and RTSP/HTTP streaming on your network (where x is the number of channels configured). The number of ports used depends on how many channels you have with RTSP streaming enabled. See Stream content using HTTP or RTSP. Note that client video players choose whether they are using RTSP/TCP, RTSP/HTTP or RTSP/UDP.

Port (or range)	Protocol	Description
		Ports 554 and 555 are also used for internal communications. If streaming is disabled, these ports remain open but refuse all external connection requests.
Random in range 32768 - 61000	UDP	If the client video player chooses RTSP/UDP, it will negotiate 4 random UDP ports (two for audio and two for video). The port range is dependent on the OS of the client video player and can change with updates to that OS.
1900	UDP	UPnP server for UPnP discovery, if enabled. See Stream using UPnP.
Random in range 50000 to 65000	TCP	UPnP media server, if enabled. Each time the UPnP server is started, a random TCP port in this range is used to enable connections with other UPnP devices.
5353	UDP	For multicast DNS discovery. See Connect using a DNS-based service discovery.
5557	UDP	Epiphan proprietary discovery method for Pearl Mini, see Connect using the Epiphan discovery utility.
8000 to 8000+(x-1)	TCP	For Flash and MPEG-TS streaming on your network (where x is the number of channels configured). The number of ports used depends on how many channels you have with streaming enabled. See Stream content using HTTP or RTSP. Ports 8000 and 8001 are also used for internal communications. If streaming is disabled, these ports remain open but refuse all external connection requests.

In addition to the incoming ports, Pearl Mini uses some outgoing connections as follows:

- **Port 30** - used for remote support access by Epiphan Systems Inc.. See Configure remote support

- **Port 80** - used for firmware update checks and downloads.

- **Publishing/streaming port** - the actual ports used for streaming to a server depends on the server and protocol used. See Streaming to a server

- **AFU file recording transfer port** - for actual ports used for AFU depends on your configuration. See File and recording transfer

Verify IP address and MAC address of Pearl Mini

There are two ways to view the current IP address and MAC address of your Pearl Mini:

- From the Network configuration page using the Admin panel.
- From the Settings menu using the touch screen on Pearl Mini.

Table 14 *Network Information*

Item	Description/Options
MAC Address	A media access control address (MAC address) is a unique identifier for the network interface. The value is read-only and cannot be changed. You may need to share this value with your system administrator.
Current IP Address	Reflects the current internet protocol address (IP address) of the system. This value is either obtained from the DHCP server (if using DHCP) or is the configured static IP address. Pearl Mini supports IPv4 addresses. It does not support IPv6 addresses.

To view network information using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Network**. The network configuration page opens.

IP Configuration for eth0

MAC address is 00:55:56:55:52:5f

Current IP address is 192.168.1.208

To view network information using the touch screen:

1. Tap the **gear** icon to open the System settings screen. If the control icons aren't showing, tap anywhere on the touch screen.

2. Tap **System Status** to see the System Status page.

3. Tap **Back** to return to the **System Settings** screen, or the **Home** icon to return to the channel view.

> If the system settings control icon won't appear when you tap the touch screen, it may be disabled. See **Configure the touch screen** to enable system information.

Configure a static IP address

There are two ways you can set up Pearl Mini to use a static IP address:

- From the Network configuration page using the Admin panel.
- From the Settings menu using the touch screen on Pearl Mini

TIP: Using the touch screen, you can choose to apply a configuration preset that contains a static network IP. See Configuration presets.

> Only IPv4 addresses are supported. Pearl Mini does not support IPv6.

To configure a static IP address using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Network** . The Network configuration page opens.

3. Select **Use static address** and enter your networking information in to the required fields. Click **Apply** when you're done.
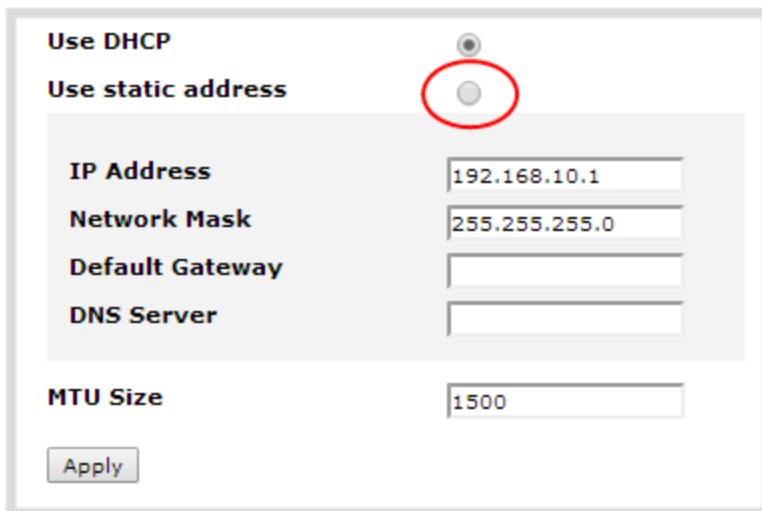
Table 15 Static IP Address Fields

Label	Description
Use DHCP	Select this radio button to dynamically obtain an IP address at boot up.
Use static address	Select this radio button to use the configured static IP address.
IP Address	The internet protocol address (IP Address) to assign. Obtain this from your network administrator. Pearl Mini supports IPv4 addresses. It does not support IPv6 addresses.
Network Mask	Also called the subnet mask, this value denotes a range of IP addresses. Obtain this from your network administrator, from another computer on the same subnet, or calculate the value using an online subnet calculator.
Default Gateway	The network node that serves as an access point to the rest of the network. This value cannot be blank unless you are using DCHP. Specify the system's IP address if you don't have a default gateway on your network.
DNS Server	The domain name system server (DNS server) translates human-readable hostnames into corresponding IP addresses. Specify the system's IP address if you don't have a DNS server on your network. This value cannot be blank unless you are using DHCP.
MTU Size	The maximum transmission unit (MTU) specifies the maximum packet size for transfer on the network. The default value is 1500, which is the largest value allowed

Label	Description
	by Ethernet at the network layer. It's best for all nodes in your network to use the same value. Only change the MTU value if you know that other nodes use a different value.

> 🛑 The default gateway and DNS Server fields cannot be left blank. If you do not have a default gateway or a DNS server for your network, enter the static IP address in those fields.

4. Reboot Pearl Mini when prompted. From the Configuration menu, select **Maintenance** and click **Reboot Now** on the Maintenance page.

5. After the system has finished rebooting, use the new IP address to log back in to the Admin panel as **admin** and verify that all changes were applied.

To configure a static IP address using the touch screen:

1. Tap the **gear** icon to open the System settings screen. If the control icons aren't showing, tap anywhere on the touch screen.

2. Tap **Network**. The Network settings page opens. The currently enabled network type (DHCP or static) is highlighted green.
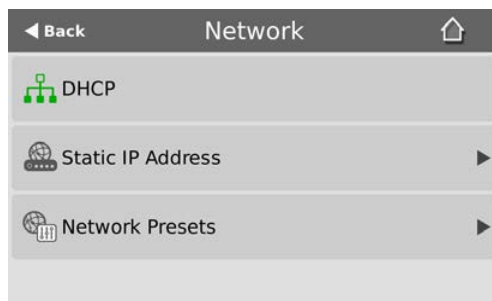
3. Tap **Static IP Address**. The Static IP Address configuration page opens.
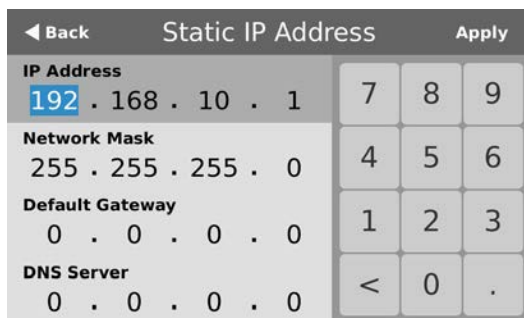
4. Tap a segment of the **IP Address** (e.g. 192) to select it and use the keypad to enter a new static IP address. Continue to enter your Network Mask, Default Gateway, and DNS server information. Tap

Apply when you're done.

> 🛑 The default gateway and DNS Server fields cannot be left blank. If you do not have a default gateway or a DNS server for your network, enter the static IP address in those fields.

Configure DHCP

If you need to switch Pearl Mini from using static IP address allocation to using dynamic allocation with DHCP, you can do this three different ways:

- Restore factory settings, which clear all your custom settings. See Perform a factory reset.
- Load a configuration preset file that uses DHCP networking. See Apply a configuration preset using the Admin panel or Apply a configuration preset using the touch screen.
- Change the network settings manually using either the touch screen or the Admin panel.

To manually select DHCP as the network type using the touch screen:

1. Tap the **gear** icon to open the System settings screen. If the control icons aren't showing, tap anywhere on the touch screen.

2. Tap **Network**. The Network settings page appears. The currently enabled network type (DHCP or static) is highlighted green.
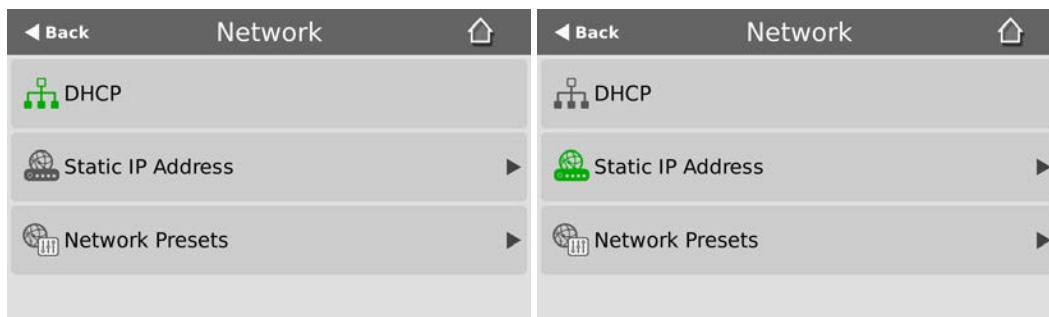
3. Tap **DHCP**, and then tap **OK** to confirm.
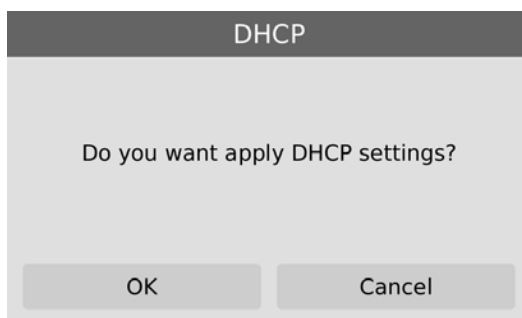
To manually select DHCP as the network type using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Network**. The Network configuration page opens.

3. Select **use DHCP** and change the **MTU Size** value if needed, then click **Apply**.

   Table 16 DHCP Fields

Label	Description/Options
Use DHCP	Select this option to dynamically obtain an IP address at boot up using DHCP
Use static address	Only select this option if you ant to use the configured static IP address instead.
MTU Size	The maximum transmission unit (MTU) specifies the maximum packet size for transfer on the network. The default value is 1500, which is the largest value allowed by Ethernet at the network layer. It's best for all nodes in your network to use the same value. Only change this value if you know that other nodes use a different value.

4. Reboot Pearl Mini when prompted. From the Configuration menu, select **Maintenance** and click **Reboot Now** on the maintenance page.

5. After the system has finished rebooting, log back in to the Admin panel as **admin** and verify that all changes were applied.

Tether to a mobile network

Pearl Mini supports tethering to a mobile device over USB. Tethered networking can work side-by-side with Ethernet routing and either networking system can be a back-up for the other.

> When the system falls over to the backup network type (i.e. from Ethernet to mobile, or vice versa) all streaming sessions with clients or servers directly connected to the system are closed and the clients will need to reconnect. You may need to provide a new stream URL (containing the new IP address) to your viewers. See the channel information page to get the new stream URL.
>
> By contrast, actively published streams are closed and reconnected via the secondary network (mobile or Ethernet) automatically, permitted the required publishing server is accessible from the new network.

To configure tethering to a mobile network:

1. Configure your mobile device to allow tethering via USB following the manufacturer's instructions that came with the device.

2. Connect the mobile device to Pearl Mini using a USB cable.

3. Login to the Admin panel as **admin**. See Connect to the Admin panel.

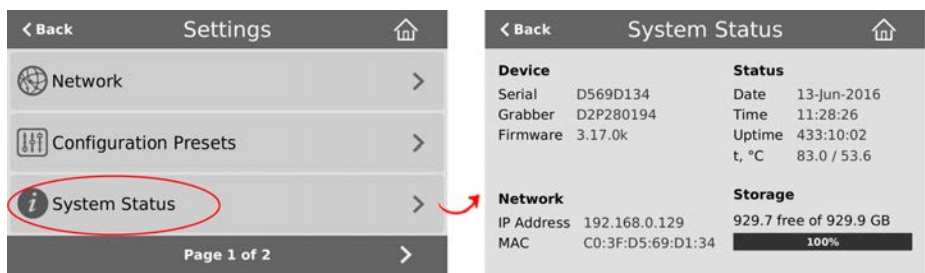4. From the Configuration menu, click **Network**. The Network configuration page opens.

5. Click **Use phone/tablet connection** and select a tethering option, then click **Apply**.

Table 17 *Mobile Tethering Options*

Label	Description/Options
Disabled	Specifies that no USB tethering is permitted.
No tethering	Specifies that USB tethering is available for connecting a mobile device as a configuration utility (i.e. using the web browser), but no mobile data is used.
Prefer ethernet	When chosen, the system tries to use the Ethernet network first. It switches to use the mobile network (tethering) when the Ethernet network is no longer available. To prevent viewer interruptions, mobile data will continue to be used until the mobile network is down or publishing is restarted.
Prefer tethering	When chosen, the system tries to use the mobile network (tethering) first. It switches to use Ethernet (hard-wired) when the mobile network is no longer available. To prevent viewer interruptions, Ethernet data will continue to be used until the Ethernet network is down or publishing is restarted. Select this setting if you only have a mobile network.

Perform network diagnostics

You can perform basic network troubleshooting tasks from the Network configuration page using the Admin panel. To troubleshoot networking issues yourself, gather the IP address and MAC address of your Pearl Mini and try to ping the IP address or use traceroute to determine the path taken to the IP address. However, note that not all networks support ping and traceroute.

If you are unable to resolve your networking issues, contact your network administrator and provide them with the IP address and MAC address of your Pearl Mini; otherwise, contact Epiphan Video support for assistance.

To ping or traceroute an IP address:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Network**. The Network configuration page opens.

3. Enter the IP address of Pearl Mini into the **Address** field and click **ping** or **traceroute**. The console-like results are displayed below the Address field.

Network Diagnostics

Address: [192.168.1.104]   [ping] [traceroute]

```
# ping -w 10 -c 4 '192.168.1.104'
PING 192.168.1.104 (192.168.1.104): 56 data bytes=


64 bytes from 192.168.1.104: seq=0 ttl=128 time=1.006 ms=


64 bytes from 192.168.1.104: seq=1 ttl=128 time=0.621 ms=


64 bytes from 192.168.1.104: seq=2 ttl=128 time=0.709 ms=


64 bytes from 192.168.1.104: seq=3 ttl=128 time=0.656 ms=


=


--- 192.168.1.104 ping statistics ---=


4 packets transmitted, 4 packets received, 0% packet loss=


round-trip min/avg/max = 0.621/0.748/1.006 ms=
```

Configure date and time

Pearl Mini uses the current date and time in naming recorded files and when synchronizing and timestamping inputs from multiple sources (i.e. when synchronizing an audio and a video source). The Admin panel lets you specify date and time settings to ensure they are correctly configured for your time zone and your network.

Topics include:

- View the current date and time settings
- Configure a time server
- Manually set the date, time, and zone

View the current date and time settings

There are two ways to view the current date and time settings of Pearl Mini:

- From the Date and Time page using the Admin panel.
- From the Settings menu using the touch screen on Pearl Mini.

You can manually set the date and time, change the time zone, and set up for a local Network Time Protocol (NTP) server from the Date and Time page using the Admin panel.

To view the current Date and Time configuration page using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Date and Time**. The Date and Time configuration page opens.
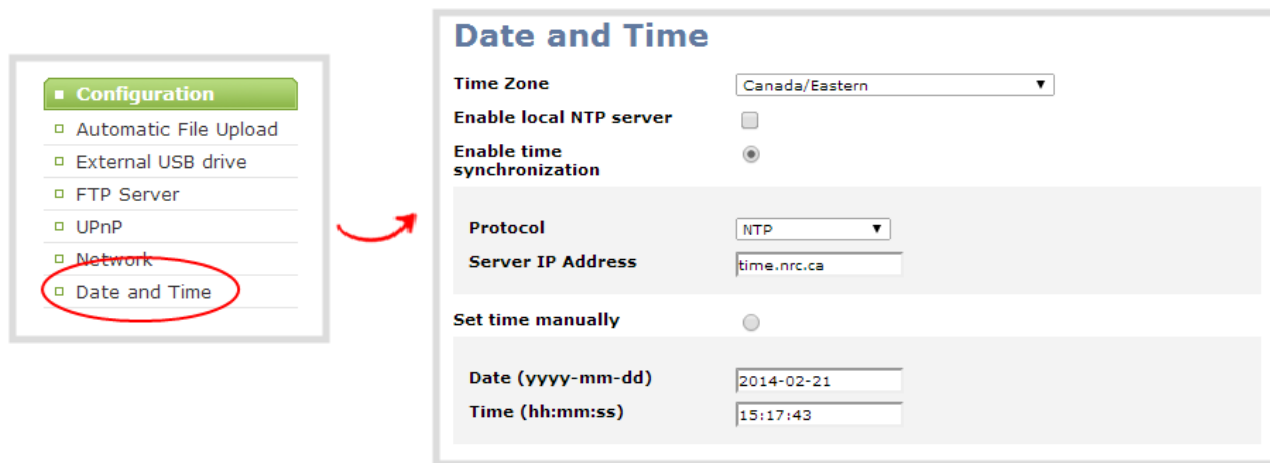
Table 18 *Date and Time configuration options*

Label	Description/Options
Time Zone	The currently selected time zone.
Enable time synchronization	Whether or not a time synchronization protocol is being used for setting time. If not selected, time is set manually.
Protocol	The time synchronization protocol.
Service IP Address	The time synchronization server address.
Set time manually	Whether or not time is set manually. If time is not being set manually, a time synchronization protocol is used.
Date	The current date. This is the current date even if the radio button Set time manually is not selected.
Time	The current time. This is the current time even if the radio button Set time manually is not selected.

To view the current date and time using the touch screen:

1. Tap the **gear** icon to open the System settings screen. If the control icons aren't showing, tap anywhere on the touch screen.

2.

3. Tap **System Status** to see the System Status page.
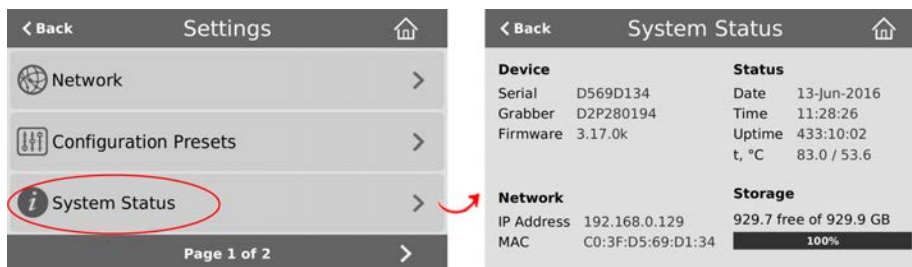
4. Tap **Back** to return to the **System Settings** screen, or the **Home** icon to return to the channel view.

> If the system settings control icon won't appear when you tap the touch screen, it may be disabled. See **Configure the touch screen** to enable system information.

Configure a time server

Pearl Mini uses the Network Time Protocol (NTP) server from the National Research Council of Canada by default. You can change to a different time server using the Admin panel. Contact your system administrator for the time synchronization server settings you should use.

The following table lists the time server types that Pearl Mini supports.

Table 19 *Supported time servers*

Label	Description/Options
NTP	Network Time Protocol (NTP) servers are used to synchronize system time. Many NTP servers are available on the Internet. Or your company may have its own local NTP server. All you need is the IP address of the NTP server and network access to the server to use that as the time synchronization source for Pearl Mini. For more information about NTP and to find NTP servers, refer to http://support.ntp.org/bin/view/Servers/WebHome.
RDATE	RDATE is a tool for querying the current time from the network. It is generally considered obsolete and has been replaced by NTP. It's offered here for backwards compatibility purposes.
PTP v1	The Precision Time Protocol (PTP) is used for clock synchronization over the Internet. It has clock accuracy in the sub-microsecond range, making it more granular than NTP.

> NTP sends UDP packets over port 123 on Pearl Mini and PTP sends UDP packets over ports 319 and 320. If Pearl Mini is behind a firewall, you must open these ports to allow traffic when Pearl Mini is configured to use either an NTP or a PTP server to obtain its time and date information.

To set the time synchronization method for Pearl Mini:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, click **Date and Time** . The Date and Time configuration page opens.
3. For local NTP servers, check **Enable local NTP server**. Otherwise, skip this step.

4. Select **Enable time synchronization** and choose the time synchronization protocol from the **Protocols** drop down.

   a. If **NTP** is selected, enter the IP address or server name for the NTP server in the **Server IP Address** field.

   b. If **RDATE** is selected, enter the IP address or server name for the RDATE server in the **Server IP Address** field and select an **Update interval**.

   c. If **PTP v1** is selected, choose a multicast address for the PTP v1 server from the **PTP domain** field.

Table 20 *PTP multicast addresses*

PTP Domain	Description
Default	PTP at multicast address 224.0.1.129
Alternative 1	PTP at multicast address 224.0.1.130
Alternative 2	PTP at multicast address 224.0.1.131
Alternative 3	PTP at multicast address 224.0.1.132

5. Click **Apply**.

Manually set the date, time, and zone

Pearl Mini uses NTP for time synchronization by default. However, you can manually set the date and time for Pearl Mini using the Admin panel. You can also set the time zone. Pearl Mini uses the Eastern (Canada) time zone by default.

To manually set the date, time, and zone:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Date and Time**. The Date and Time configuration page opens.

3. Enter the current date in the **Date** field using the format *yyyy-mm-dd* and enter the current time in the **Time** field using the format *hh:mm:ss*.

4. Select a time zone from the **Time Zone** field.

5. Click **Apply**.

Format the SD card

Before you can use your SD card for recording video using Pearl Mini, you must format the SD card for the Ubuntu operating system using the Admin panel. We recommend using a minimum class 10 SD card that is EXT4 formatted. The SD card should have at least 64 GB capacity and should not exceed 512 GB.

> 🛑 Any content that's contained on the SD card is lost when the SD card is formatted. The Ubuntu formatted SD card cannot be used to transfer files to iOS or Windows systems. Use a USB memory device to manually transfer files instead.

To format your SD card using the Admin panel:

1. Insert the SD card into the SD card slot on Pearl Mini.

2. Login to the Admin panel as admin, see Connect to the Admin panel.

3. From the Configuration menu, click **SD Card**. The SD Card configuration page opens.

4. Select either quick disk format or the full disk format, then click **Format**. A full disk format checks for bad blocks on SD card and marks any that are found on the ext4 partition.

You must wait for the formatting to finish before removing or recording to the SD card. The amount of time it takes to format depends on the capacity of the SD card and if you select quick disk format or the full disk format.

You can check if the SD card is formatting using the touch screen when you select the Settings gear icon and tap **System Status**.
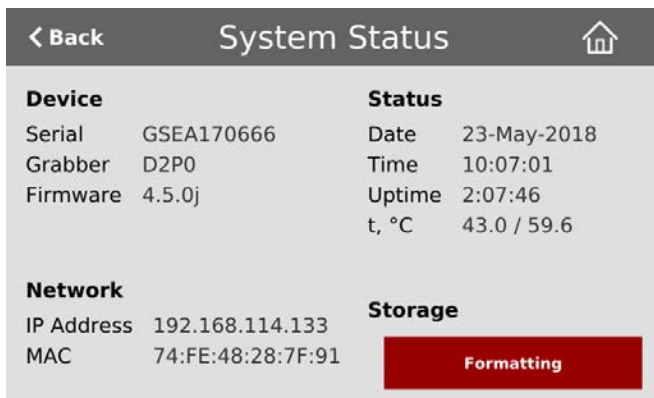
> 🛑 Do not remove the SD card while it is being formatted.

Audio input ports

You can connect external audio devices like mixers and microphones directly to the audio input ports on Pearl Mini. There are:

- Two XLR/TRS combo jacks (Mic/Line 1 and Mic/Line 2). These two ports are configured as a left/right stereo pair by default.

    - XLR mic-level inputs (balanced)

    - TRS 1/4" line-level inputs, + 4.0 dBu (balanced/unbalanced)

- One 3.5 mm stereo mic-level for electret microphones

- One RCA stereo pair consumer line-level input (-10 dBV)

The two XLR/TRS combo jacks on Pearl Mini are configured as a stereo pair by default. You can configure the two combo jacks as two separate mono audio inputs using the Admin panel . You can also enable or disable phantom power for the two XLR ports.

Topics include:

- Enable or disable phantom power

- Show a channel or video source on the output port

For details about the audio inputs, see AV inputs.

Enable or disable phantom power

Phantom power is not enabled on the XLR audio input ports by default on Pearl Mini. You can enable 48 V Phantom power for the two XLR ports using the Admin panel.

When phantom power is enabled:

- 48 V phantom power is applied to both XLR port 1 and XLR port 2.

- The phantom power LED beside the XLR/TRS combo jacks on the rear panel of Pearl Mini is solid on.

> 🛑 Connecting devices that are not designed for phantom power when phantom power is enabled for the two XLR ports can seriously damage those devices. Always check the phantom power LED before connecting devices to the XLR ports. A direct box can be used to provide the correct mic-level signal to the XLR port and offers some isolation protection in case of accidental exposure to 48 V phantom power.

To enable or disable phantom power:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Inputs menu, click **XLR/TRS Audio**. The XLR/TRS Audio page opens.

3. Check **Phantom power 48V**, then click **Apply**.
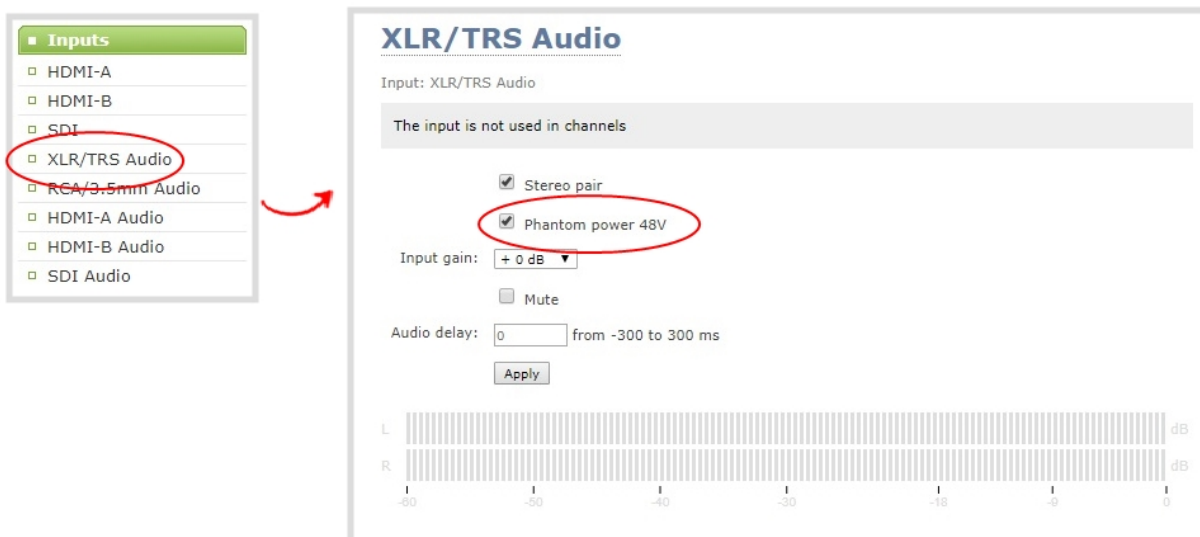
Configure audio ports for stereo or mono

The two combo XLR/TRS audio input ports on Pearl Mini ports are configured to work together as a stereo pair by default.

- XLR/TRS 1 = left
- XLR/TRS 2 = right

Using the Admin panel, you can configure the ports to function as a stereo pair or as two separate mono ports.

To configure audio ports as stereo or mono:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Inputs menu, click **XLR/TRS Audio**. The XLR/TRS Audio configuration page opens.

3. Do one of the following.

    a. To make the two XLR/TRS ports function as a stereo pair, check **Stereo pair** and click **Apply**.

    b. To make the two XLR/TRS ports function as separate mono ports, uncheck **Stereo pair** and click **Apply**.
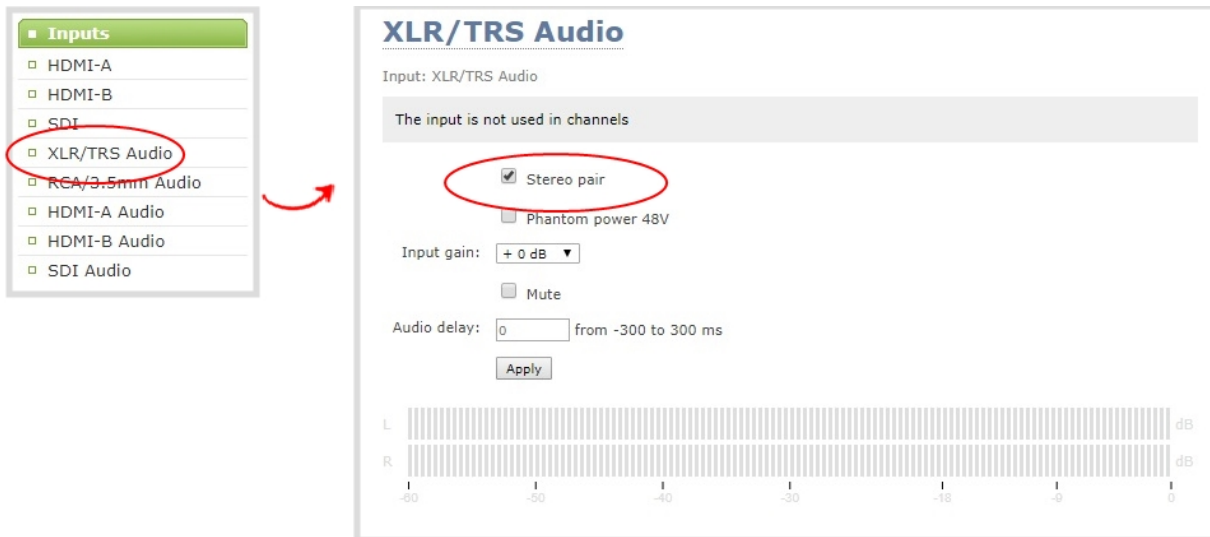
> ☑️ When set to mono, two complete sets of parameters and two audio VU meters appear on the XLR/TRS Audio page - one for each audio input port on Pearl Mini.

What's next?

You can also adjust the input gain, mute the audio, and add delay to the audio signal on the XLR/TRS Audio page using the Admin panel, see Adjust audio gain and delay.

Adjust audio gain and delay

Pearl Mini does not introduce audio delay and has near-zero latency when capturing. However, other external factors can cause audio to become de-synchronized, such as the length of audio cables or the configuration of your equipment. The audio delay feature helps you adjust audio coming from external sources so that your video and audio sources are synchronized when captured, streamed, and recorded.

By default, there's 0 ms of delay applied to your audio sources. You can set the amount of delay for any audio source using the Admin panel and apply from -300 ms and +300 ms of delay.

Adjusting the **Input Gain** for an audio source affects the volume for that audio source in recordings, streamed output, video output ports, and in the headphone jack.

This table offers some guidelines for adjusting the gain at the audio input port of Pearl Mini for common types of audio input devices. You should add the suggested gain to the audio input to get an average signal to register at a nominal level in the VU meter (i.e. where the green bars change to yellow). The actual amount of gain needed depends on the strength of the original audio signal. For more information about the audio

inputs on Pearl Mini, see Selecting an audio source and AV inputs.

Audio source	Input port	Gain
Dynamic microphone	XLR	Add +50 to +60 dB gain to the audio input port.
Electret microphone	XLR	Add +18 to +40 dB gain to the audio input port.
	3.5 mm	Add +6 to +12 dB gain to the audio input port.
Wireless microphone receiver	XLR	Add +18 to +40 dB gain to the audio input port.
	3.5 mm	Add +6 to +12 dB gain to the audio input port.
Condenser microphone with phantom power	XLR	Add +40 to +60 dB gain to the audio input port.
Mobile phone or other consumer line level device	TRS	Add +6 to +12 dB gain to the audio input port.
	RCA	Nominal
Professional mixer	TRS	Nominal
	RCA	Not recommended.

Ensure the audio input source is connected to an analog audio input port on Pearl Mini before proceeding.

To adjust the gain and delay for an audio source:

1. Login to the Admin panel as **admin**. See Connect to the Admin panel.

2. From the Inputs menu, select an audio source. The audio configuration page for the audio source opens.
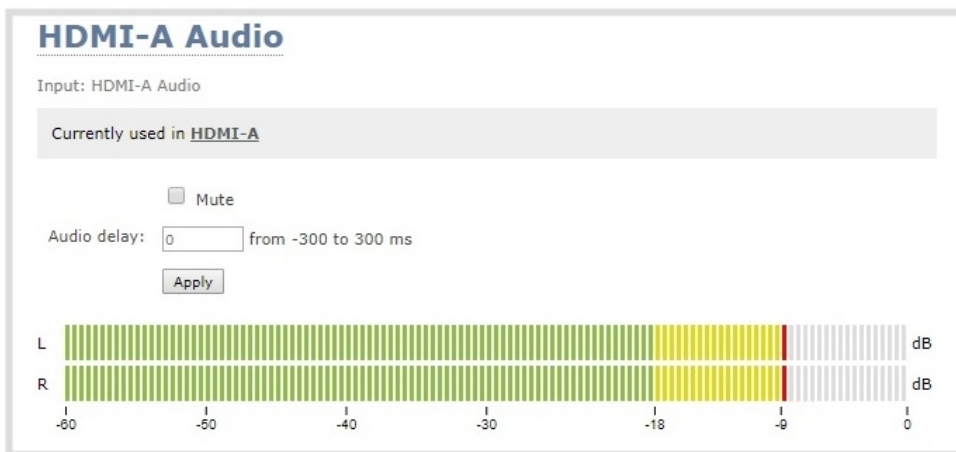
3. In the **Input Gain** field, select the amount of gain to apply to the audio source.

4. In the **Audio delay** field, enter a value between 300 and -300. A positive value adds delay to the audio signal. A negative value adjusts the audio to start earlier.

5. Click **Apply**.

Video output ports

Video output ports on Pearl Mini let you connect external displays for confidence monitoring. You can use the Admin panel or the touch screen on Pearl Mini to send any video source or channel to the video output port with (or without) the audio.

Topics include:

- About video output ports
- Video output port resolution
- Show a channel or video source on the output port
- Preview the video output port
- Disable the video output port
- Disable or enable audio and output port volume
- Display and reposition the audio VU meter
- Rename a video output port
- Mirror the video output port display

About video output ports

An HDMI video output port is located on the rear panel of Pearl Mini. The output port is set to display HDMI A input port by default, but you can change this using the Admin panel The video output port is configured to maintain aspect ratio, use the display's default resolution, and include audio at 100% volume. However, the audio meter is not shown.

> ☑ Using the video output port takes CPU cycles and adds to the overall load on your Pearl-2. For optimum performance, keep displays disconnected from the video output port if you're not using them. Setups that already put a heavy load on the system's CPU may be negatively impacted if the external video output port is used.

You can change the video output port defaults and send any video source or channel to the port using the Admin panel or Epiphan Live. Audio is included for channels that have audio.

To set and configure the video output port settings using the Admin panel, see Preview the video output port. To set and configure video output port settings using Epiphan Live, see Monitor and setup the output port source and audio.

Important considerations

- When changing encoding parameters for a channel that's displayed on the video output port, it may revert to the display's default resolution if the output resolution is set to "Same as source". To resolve this, change the video output to a different resolution then back to "Same as source".

- When the output port settings are changed, or when an external monitor is connected or disconnected from the port, the displayed output flashes once.

Video output port resolution

The video output port's **resolution** (also known as frame size or display mode) defines the number of pixels displayed horizontally and vertically. For example, the resolution 1920×1080 (1080p) produces an image that is 1920 pixels wide by 1080 pixels tall.

> ☑ Pearl Mini always assumes that the output display uses square pixels.

The **aspect ratio** (eg. 4:3 or 16:9) describes the proportional relationship between the video output's pixel width and height. The resolution 1920×1080 (1080p), for example, is quite a bit wider than it is tall. The ratio of its width to height is 16 to 9, which has an aspect ratio that is 16:9.

By default, you can choose from the following output resolutions in 4:3 and 16:9 aspect ratios for your video output ports, but you can also change settings to allow a variety of other resolutions through.

4:3 resolutions

1024×768	1280×960	1400×1050

16:9 resolutions

1280×720	1360×768	1920×1080

Show a channel or video source on the output port

You can send any channel or video source to the video output port and adjust the video output resolution and aspect ratio using the Admin panel.

The video output port frame rate is set automatically to the channel's configured frame rate. However, when sending a video source to the video output port, you have the option to configure the frame rate of the video output port.

For channels with audio, you can configure whether or not audio is included and adjust the volume. You can also choose to include the audio meter. The audio meter is set to a fixed size of 15% of the width (or height if displayed horizontally) of the display. Audio is not supported when sending a video source to the video output port.

To set up the video output port using Epiphan Live, see Monitor and setup the output port source and audio.

To display channel or video source on the video output port:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Outputs menu, click the output port (**HDMI 1** or **HDMI 2**). The video output port configuration page opens.

3. In the **Source** field, select a channel (prefixed by the word **Channel**) or a video source (prefixed by the word **Input**).

HDMI 1

Status

Running at 1920x1080@60

Settings

Source: Channel: Program ▼

Resolution: 1920x1080 ▼

☑ Keep aspect ratio

☐ Mirrored

☐ Enable audio

Audio meter: do not display ▼

Apply

HDMI 1

Status

Running at 1920x1080@60

Settings

Source: Input: HDMI 1 ▼

Resolution: 1920x1080 ▼

☑ Keep aspect ratio

☐ Mirrored

Frame rate: 30

Apply
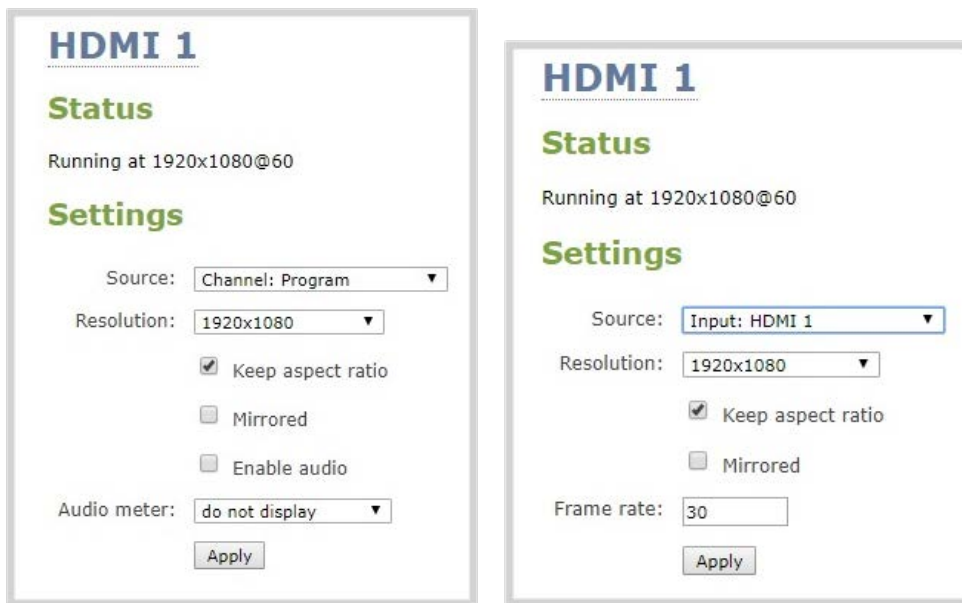
4. In the **Resolution** field, select the resolution for the video output port.

Value	Description
Same as source	Set the output to the same resolution as the channel or video source. If that resolution is not supported by the display, the video output port will negotiate a new resolution with the display (generally this ends up being the display's default resolution).
Destination default	This is the default value. Each display has a preferred resolution, and when you choose this setting, the video output port will use the display's default resolution.
640×360, 640×480, 960×540, 1024×768, 1280×720, 1280×960, 1360×768, 1400×1050, 1920×1080, 1920×1200, 2560×1440	Choose a specific resolution for the output port. For an explanation of the different choices, see Show a channel or video source on the output port.

5. Do one of the following:

   a. Check **Keep aspect ratio check** to have the system maintain the correct aspect ratio. If the aspect ratio is different between the source and the chosen display aspect ratio, black bars are automatically inserted at the top and bottom or left and right sides of the video.

   b. Uncheck **Keep aspect ratio check** to have the system stretch the source to fit the aspect ratio of the display.

6. For video sources, select a **Frame rate** to specify the number of frames per second to send out over the video output port. Then click **Apply** when you're done.

7. For channels, do the following:

    a. Check **Enable audio** to include audio in the output. Leave this unchecked for no audio with the video.

    b. (Optional) For channels with audio enabled, adjust the volume. Enter a value from 0 to 100 percent in the **Audio volume** field.

    c. (Optional) For channels with audio enabled, choose whether or not to display the audio meter from the **Audio meter** drop down.

    d. If displaying the audio meter, select horizontal or vertical from the **Audio meter orientation** drop down to change the orientation of the displayed audio meter.

    e. Click **Apply**.

> The audio meter can be displayed even if you are not playing audio over the video output port (i.e. even when the **Enable audio** check box is not checked).

Preview the video output port

You can preview the video signal that is shared over your video output port by looking at the preview window at the bottom of the video output configuration page in the Admin panel.

> The preview is updated every few seconds and always maintains the same aspect ratio as the source it is copying. It doesn't reflect black bars, the audio meter or actual aspect ratio/resolution on the display.
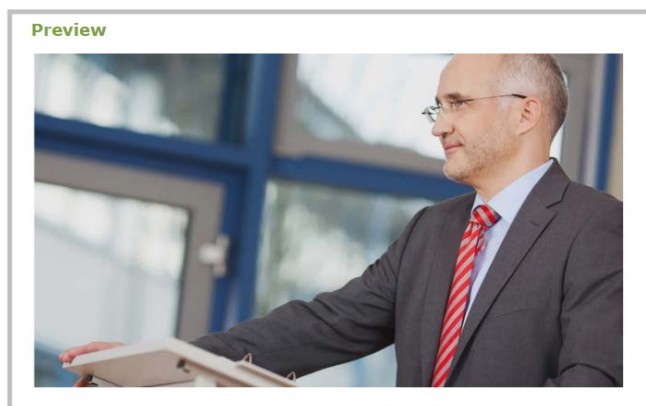
If the video output port is showing a source and that source has no signal, the source's no signal image is displayed.

If the video output port is showing a channel and that channel is unavailable or has no signal, a no signal message is shown for 2.5 seconds, then the display output is changed to a black screen.

> You can also preview video output ports using the Epiphan Live control interface. See **Monitor and setup the output port source and audio** for more information.

Disable the video output port

You can use the Admin panel to disable a video output port so that even if a display is connected, nothing is shown.

To disable video output ports using the Epiphan Live, see Monitor and setup the output port source and audio.

To disable the video output port using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Outputs menu, click the output port (**HDMI 1** or **HDMI 2**). The video output port configuration page opens.

3. In the **Source** field, select **none** to disable the video output port and then click **Apply**.
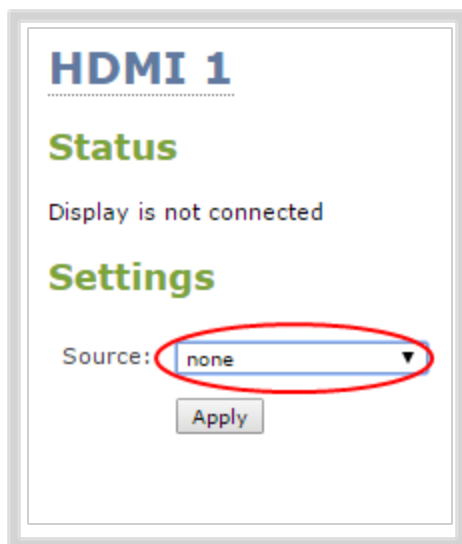
Disable or enable audio and output port volume

If you're displaying a channel as the source for your video output port, audio for that channel is also encoded and sent over the port by default. You can disable the audio on the output port using the Admin panel. You can also adjust the volume of the audio on the video output port using the Admin panel.

> Audio pass-through, adjusting the volume, and displaying an audio meter are only supported when a channel is the selected video source.

To disable the audio for a channel on the video output port and adjust the volume using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Outputs menu, click the output port (**HDMI 1** or **HDMI 2**). The video output port configuration page opens.

3. Check **Enable audio** if you want audio on the video output port. Uncheck **Enable audio** if you don't want audio on the output port.

HDMI 1

Status

Display is not connected

Settings

Source:	Channel: HDMI-A ▼
Resolution:	same as source ▼
	☐ Keep aspect ratio
	☑ Enable audio
Audio volume:	100 %
Audio meter:	left top corner ▼
Audio meter orientation:	horizontal ▼
	Apply
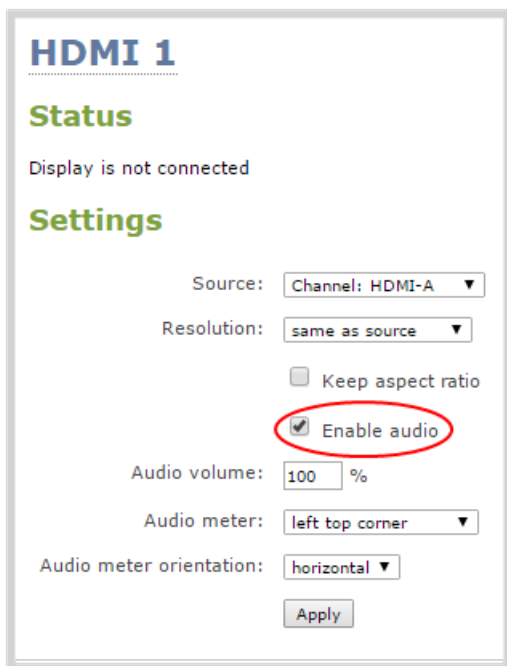
4. When audio is enabled, the **Audio volume** field appears. To adjust the volume, enter a value between 0 and 100.

5. Click **Apply**.

> ✅ You can also disable or enable audio on the video output port and adjust the volume using
> Epiphan Live, see **Monitor and setup the output port source and audio**.

Display and reposition the audio VU meter

When sending a channel with audio over the video output port, you can choose whether or not to display the audio VU meter using the Admin panel. You can also determine the position and orientation of the audio meter.

> ✅ Audio pass-through, adjusting the volume, and displaying an audio meter are only supported
> when a channel is the selected video source.

To configure the audio meter for the video output port:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Outputs menu, click the output port (**HDMI 1** or **HDMI 2**). The video output port configuration page opens.

3. In the **Audio meter** field, choose an option.

Value	Description
do not display	No audio meter is displayed.
left top corner	Audio meter is displayed at the top left side of the display.
right top corner	Audio meter is displayed at the top right side of the display.
left bottom corner	Audio meter is displayed at the bottom left side of the display.
right bottom corner	Audio meter is displayed at the bottom right side of the display.

4. If you've selected a location for the audio meter, you can also select an orientation (horizontal or vertical) in the **Audio meter orientation** field.

5. Click **Apply**.

Rename a video output port

Using the Admin panel or Epiphan Live, you can easily change the video output port default name from HDMI 1 to something more suitable. For example, Projector Output or Confidence Monitor.

To change a video output port name:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Output ports menu, click the video output port. The video output port configuration page opens.

3. Click the **video output port name** at the top of the page and enter a new name using your keyboard. The text turns red when it's selected for editing.
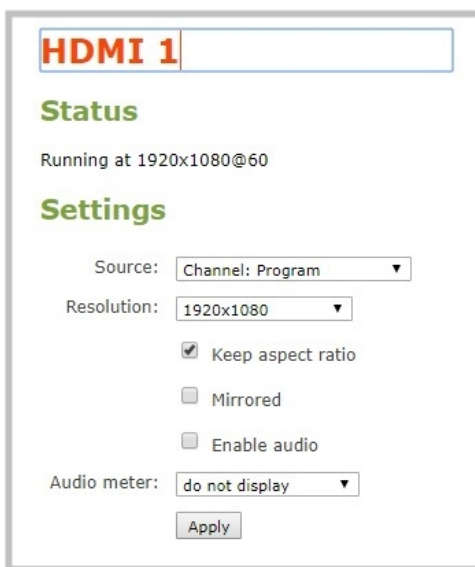
4. Press **Enter** using your keyboard to save the changes.

> You must press Enter to save the new name. The **Apply** button does not save the source name change.

Mirror the video output port display

You can use the Admin panel to mirror the original video source on the output port so that it appears reversed on the connected display.

To mirror the video source on the video output port:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Outputs menu, click the output port you want to mirror. The video output port configuration page opens.

3. Check **Mirrored** to flip the video source's orientation on the display port. Uncheck **Mirrored** to display the video source in it's original orientation, then click **Apply**
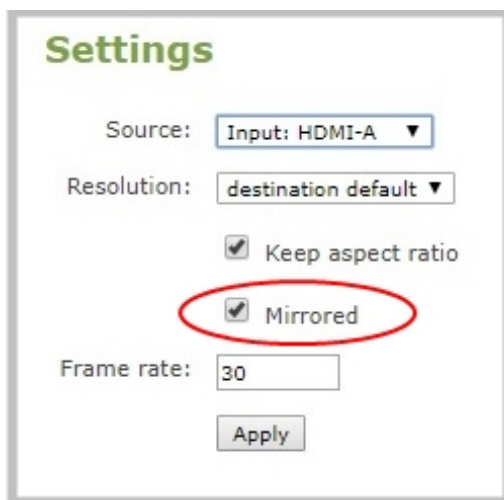
Configuration presets

Configuration presets are the perfect solution for backing up your system configuration, for situations where you have changing configuration requirements for your Pearl Mini or when you are managing a number of systems and you want them to have similar configurations.

Topics include:

- About configuration presets
- Configuration preset considerations
- Configuration groups
- The Factory default configuration preset
- Create a configuration preset
- Apply a configuration preset using the Admin panel
- Apply a configuration preset using the touch screen
- Export and import configuration presets
- Update a configuration preset
- Delete a configuration preset

About configuration presets

Configuration presets are groups of settings that get applied to the system, leaving other important settings intact. They make it easy to manage multiple Pearl Mini systems and shared spaces, like a studio, a breeze to set up and maintain a consistent setup each time you go to use your Pearl Mini.

Configuration presets let you quickly apply settings to your Pearl Mini so you can reconfigure it on the fly and get a consistent set up each time. You can even download a configuration preset and upload it to other Pearl Mini systems.

The system's settings are divided into the following configuration groups. You can choose to include any number and combination of configuration groups in a preset and create as many different configuration presets as you need. For a complete list of individual settings that are included in each configuration group, see About configuration presets.

 System   Sources   Automatic file uploads

	Network		Channels		EDID
	Output ports		Touch screen		
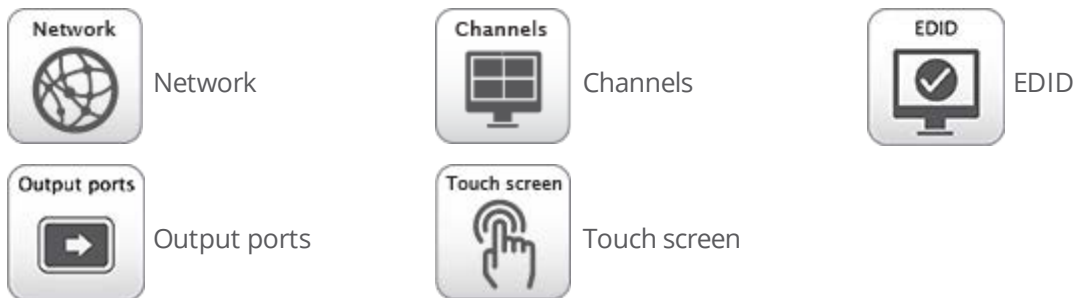
You can create and apply any saved configuration preset from the Configuration menu when you select **Maintenance** using the Admin panel. A special **Factory default** configuration preset, which cannot be erased, is included in the list of configuration presets. Use that to return to the factory setup without destructively erasing any saved recordings or media files you've uploaded.

It's important to note that configuration presets are applied over existing settings. They affect only the settings groups included in the preset. All other settings are unaffected. Read the Configuration preset considerations section carefully to understand caveats around using configuration presets.

Example of presets in action

You could upload custom background images to Pearl Mini in advance of a conference and create custom channel configuration presets for several different keynote speakers, each with a different setup, and then apply them later when you need them.

For example, you could create two configuration presets called Session 1 and Session 2. Each session could include things like custom backgrounds, images and logos, channels and layouts, metadata, streaming settings, network settings, and automatic file upload (AFU) locations. Then download those presets to your local computer so you can upload them to your entire fleet of Pearl Mini systems.

> Channel configuration includes any applied backgrounds and image files. If these files aren't present when the configuration preset is saved, the save function will fail. Be careful when deleting background images and logo files.

At the conference, simply apply the configuration preset that you need for the appropriate session using either the Admin panel or the touch screen on Pearl Mini. When applying the configuration preset, all other preset groups remain unchanged. The preset only affects channels and their configuration.

    Session 1 preset

Session 1 presenter data
and background image

plus the conference IP
address

Session 2 preset

Session 2 presenter data
and background image

plus the conference IP
address

After applying a configuration preset, recorded files from the previous session remain present on the system. If AFU is configured, the recorded files continue to upload even after the new configuration preset is applied (if AFU is not yet complete), but the channels reflect the newly loaded session's background file name and presenter name.

Configuration preset considerations

There are important considerations that you should know before you start using configuration presets, including:

- Access to presets and privacy considerations
- The potential to lock the touch screen
- Channel and recorder index number behavior
- Recording and streaming states
- Recorded files in channels and recorders
- Deleting channels and recorders

Access to presets and privacy considerations

- Recorded files are not removed when you apply a configuration preset. Any user with access to Pearl Mini has access to all the saved recordings, channel layouts, etc that are associated with an applied configuration preset.

- Configuration presets can be overwritten and deleted without a password. Users who are logged in to the Admin panel can remove or change an existing configuration preset.

- Applying a configuration presets does not clear the settings from groups that aren't a part of the preset, which means user information is not private.

- Media and recorded files can be deleted, affecting more than just the currently applied configuration preset. Users can erase uploaded media or recordings that belong to other users.

> **STOP** Media files that you've uploaded to Pearl Mini (logos, background images, etc) are included in the configuration preset and must be present on the system when creating a preset that includes the **Channels** group; otherwise, a failure is reported.

Locking out the touch screen

The **touch screen** configuration group includes all the security settings for the touch screen. It's possible to apply a preset that effectively locks out all further use of the touch screen. If this happens, use the Admin panel to re-enable the touch screen, see Configure the touch screen.

Channel and recorder index number behavior

Each channel and recorder has an index number. The first channel created on a system is channel 1, subsequently channel 2, 3, 4, etc. Recorders are also created starting at index 1 with numbers incrementing as new recorders are created. The channel (or recorder) index number is found to the left of the channel or recorder name in the Admin panel:
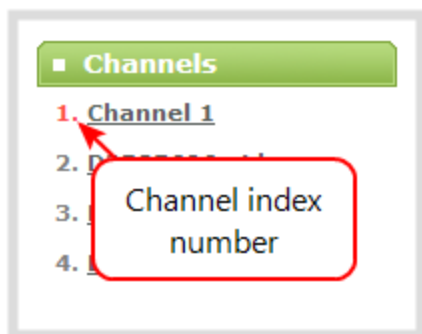
Configuration presets that contain the **channels** configuration group specify the channels in the preset by their index number. This means if you have channels 1, 2, 3 and 4 when you save your preset, applying that preset will overwrite the configuration of your current channels with indexes 1, 2, 3 and 4. If prior to applying that preset you also had channels with indexes 5 and 6, the configuration settings for those two channels are erased when the preset is applied (because the preset only has 4 channels).

There are three areas where channel (and recorder) index numbers affect what happens when applying configuration presets. Read Recording and streaming statesRecorded files in channels and recorders and Deleting channels and recordings for more information.

Recording and streaming states

The Configuration groups section of this chapter shows that each channel and recorder's recording and streaming state is included in the **channels** configuration group. This means that if a channel is streaming or a channel (or recorder) is recording at the time you create a configuration preset, it will immediately start recording (or streaming) when you apply that preset. Similarly, if a configuration preset is saved when channels or recorders are not recording (or streaming), those channels and recorders will not be recording (streaming) when the preset is applied.

> 🛑 This means a channel or recorder may stop recording or streaming as a result of applying the preset.

For example, when applying a preset with channel 3 set to record (the same example applies for streaming):

- If channel 3 exists prior to applying the preset and is already recording, the file will continue recording uninterrupted unless the recording file type is different in the preset (in which case a new file is started).

- If channel 3 exists prior to applying the preset and is not already recording, it immediately begins recording.

- If no channel with index 3 exists prior to applying the preset, the channel is created and it immediately begins recording.

Recorded files in channels and recorders

Channels and recorders keep a list of files recorded in their **Recordings** section of the Admin panel. These files remain on the system even if the channel or recorder configuration is changed or removed as a result of applying a configuration preset.

For example, prior to applying your configuration preset, you have channels with indexes 1, 2 and 3; each of these has five recording files. When you apply a configuration preset that has channels with index 1 and 2 only, you'll notice those channels each still have the same 5 recording files. **Channel** with index 3 is no longer present, but the files are not lost!

Overwritten channel files are still available. To access and download/delete these recorded files, enter the following into the address bar:

http://<deviceIP>/admin/channelN/archive or

http://<deviceIP>/admin/recorderN/archive, where N is the index of the removed channel/recorder.

> For example, if a **Channel** with index 3 is no longer present, its corresponding files can be accessed by entering the following into the address bar:
>
> http://192.168.0.183/admin/channel3/archive

If you now create a new channel with index 3 (or load a preset that contains a channel with index 3), you'll find it starts with five recorded files in the **Recordings** section. These are the same recorded files that existed at the start of this example.

Furthermore, if you delete any of the recordings, you are deleting the *only* instance of those files. Using our previous example, if you delete one of the five recordings from channel index 1, you'll find that even after applying different presets channel 1 will have only four recorded files.

Deleting channels and recordings

Recorded files are stored on the system based on their channel or recorder number. All files saved for channel index 1 are in one folder, and all files for recorder index 2 are in another. When you **delete** a channel (or recorder), you permanently delete all recordings for that channel (or recorder) even if those recordings were made while a different preset is applied.

> Applying a configuration preset with a different set of channels or recorders is **not** the same as deleting a channel.

When deleting a channel or recorder that has recorded files, the Admin panel warns you of other configuration presets that use the same channel or recorder index numbers. When you see this prompt, we recommend you take a moment to look through the **Recordings** list to make sure you're OK to proceed with permanently deleting all the recorded files.

The page at 192.168.0.28 says: ✕

Are you sure you want to remove this channel with and all
related recorded files?
* 9 recorded file(s).
* These recordings could have been made when using the
following configuration preset(s): extra channel, recording,
recordingTest, session 1, session 2, test.
You can't undo this action.

OK   Cancel
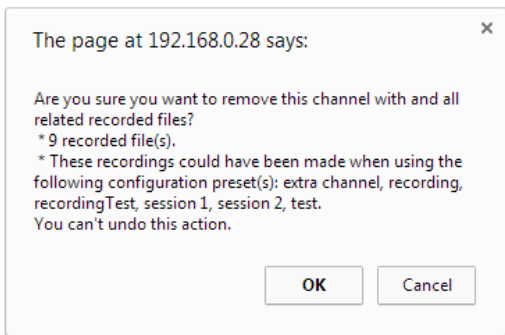
Configuration groups

The following table describes what settings are saved with each configuration group.

Table 21 *Configuration group definitions*

Group Name	Symbol	Settings included in the configuration group
System	System	Date and time settings, serial port settings, remote support settings, custom disk check schedule, access passwords, deny/allow lists and LDAP configuration settings.
Network	Network	Network settings and tethering configuration.
Sources	Sources	All audio and video source configuration settings (including no signal images) except EDID settings, which are in their own group.
Channels	Channels	All channel configuration data and current recording state, all layouts, images used in layouts, streaming state, all recorder configuration data and current recording state, individual and global UPnP settings.
AFU	Auto File Upload	Automatic file upload type and parameters. SFTP/SCP **private keys** are included (in encrypted format) in the automatic file upload preset.
EDID	EDID	EDID settings for sources. (Applying configuration presets with this group automatically applies the included EDIDs. This process can take a while.)

Group Name	Symbol	Settings included in the configuration group
Output ports	Output ports	All configuration settings for the output ports.
Touch screen	Touch screen	Permitted touch screen use settings.

The **Factory default** configuration preset

You can apply the default factory configuration preset to Pearl Mini, which resets most the settings in each of the main configuration groups. Applying the factory default configuration preset is similar to a factory reset, but a **Factory reset** is more invasive. This table describes the differences.

Table 22 *Factory default configuration preset vs a factory reset*

Item	Factory default configuration preset	Factory reset function
Deletes all created channels	✓	✓
Deletes all recorded files in channels		✓
Deletes all created recorders	✓	✓
Deletes all recorded files in recorders		✓
Resets network configuration	✓	✓
Resets touch screen configuration	✓	✓
Resets user passwords	✓	✓
Deletes all created configuration presets		✓
Deletes all branding files		✓
Resets all Source settings	✓	✓
Resets EDID to factory	✓	✓
Deletes all SCP/SFTP identities	✓	✓

Item	Factory default configuration preset	Factory reset function
Deletes all LDAP settings	✓	✓
Deletes all Automatic file upload settings	✓	✓

To apply the factory default configuration preset, you can Apply a configuration preset using the Admin panel or Apply a configuration preset using the touch screen and select the **Factory default** configuration preset using either of these procedures. A reboot is required.

To do a factory reset, see Perform a factory reset.

Create a configuration preset

You can create as many configuration presets as you need; however, there's a limit to the amount of space available for configuration presets. A maximum of 256 MB is available for configuration presets and the maximum size of a single configuration preset is 128 MB.

For each configuration preset you create, you get to name the preset and choose which groups of settings to include. See Configuration groups for which settings are included in each group.
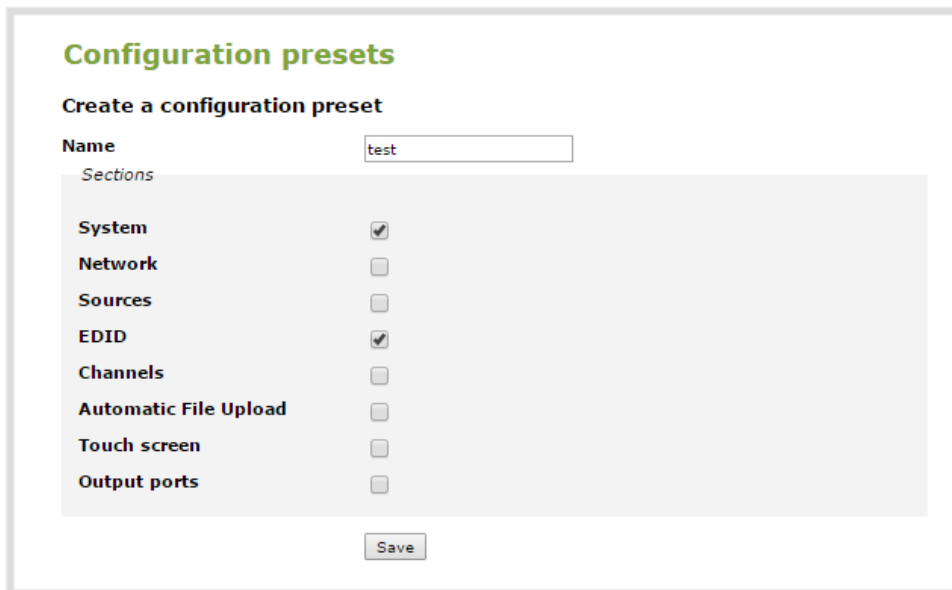
After you're finished configuring your Pearl Mini, it's good practice to save a full backup with all groups selected so that you can restore your full configuration at a later date.

> Configuration presets that include **network** or **system** settings require a system reboot when applied.

To create a configuration preset:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, click **Maintenance** . The maintenance page opens.
3. In the **Configuration presets** section, enter a name for your configuration preset in the **Name** field.

4. Check the configuration groups you want to include in the preset. For a full system backup, select all groups.

5. Click **Save**. Your configuration preset appears in the list.

If you try to save a configuration preset but one or more of the related image files is missing, an error message is displayed. You'll be unable to save the preset until the missing files are restored or the layouts referencing the missing files are modified to remove the bad references.

If you try to save a configuration preset but there isn't enough space, an error message is displayed. You'll need to delete some presets before proceeding.

Apply a configuration preset using the Admin panel

When you apply a configuration preset, the system settings for all included configuration groups are updated. Other settings on the system are not affected. For example if you apply a preset that includes the configuration groups **channels** and **automatic file upload**, your network settings, passwords, time server, source configurations, etc are not modified. Similarly, if you apply a configuration preset that has only **network** settings included, only the network settings change.

If you apply a preset that has the **network** or **system** configuration group, a reboot is required. If you apply a preset that has the EDID configuration group, the system may appear unresponsive for a short time while it applies these EDIDs to the video grabbers.

You can verify which configuration groups are included in a preset by looking at the list to the right of the configuration preset name. The term 'all' means all groups are included. Otherwise groups are listed individually.

> You may apply multiple presets one after another. If you apply two (or more) configuration presets that include a particular configuration group, the settings (for that group) from the last applied preset are the active settings. In short, last in wins.

To apply a configuration preset using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Maintenance**. The maintenance page opens.

3. In the **Configuration presets** section, click the **Apply** button next to the configuration preset you want to apply. Click **OK** when prompted.
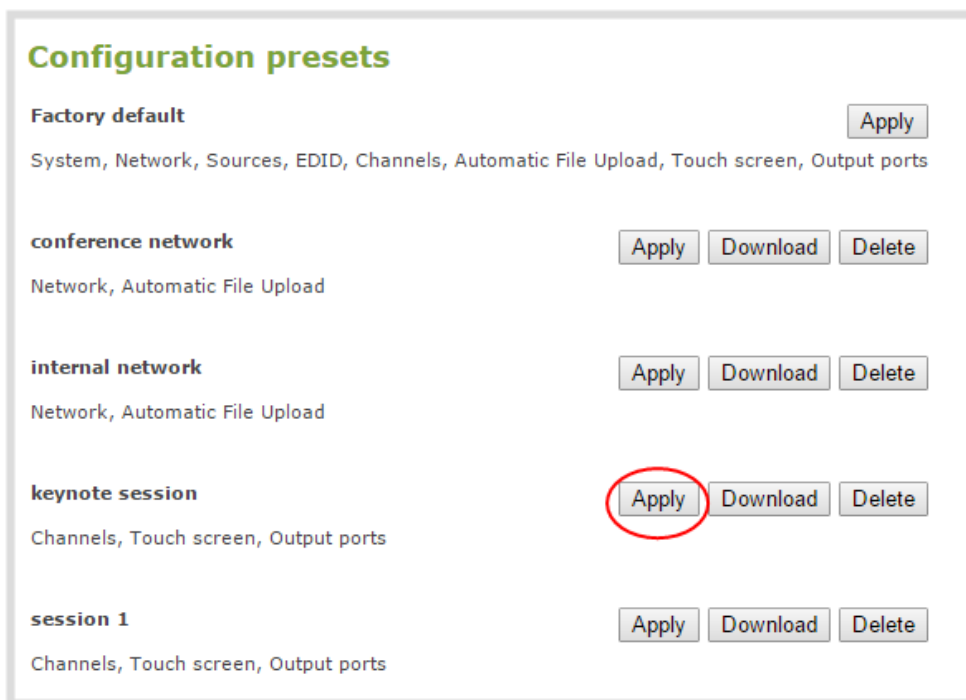
> If the configuration preset includes the **network** or **system** configuration groups, a reboot is necessary. Pearl Mini will reboot automatically if you pressed **OK** to apply the preset.

Apply a configuration preset using the touch screen

You can use Pearl Mini's touch screen to apply configuration presets. If you apply a preset that has the EDID configuration group, the system may appear unresponsive for a short time while it applies these EDIDs to the

video grabbers.

> Configuration presets that only contain the **network** configuration group can also be applied using an alternative method, which is described at the end of this topic.

To apply a configuration preset using the touch screen:

1. Tap the **gear** icon to open the System settings screen. If the control icons aren't showing, tap anywhere on the touch screen.
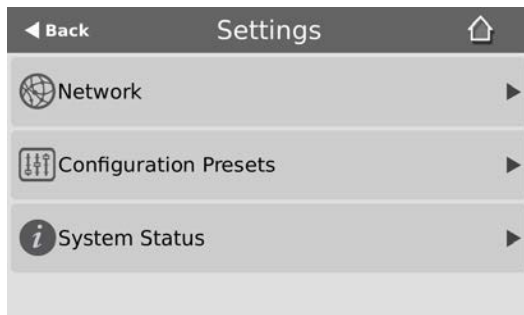
2. Tap **Configuration Presets**. A list of all the saved presets appears. The configuration preset to reset Pearl Mini to the Factory defaults is always listed first.
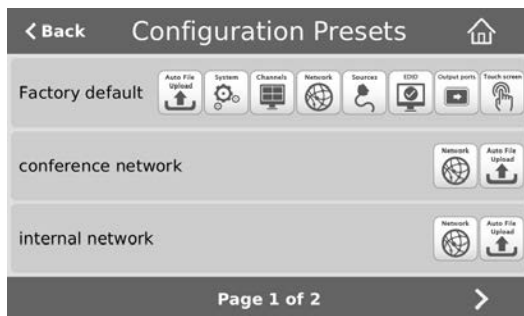
3. Use the arrows at the bottom of the page to navigate through the list and tap the name of the preset you want to apply.
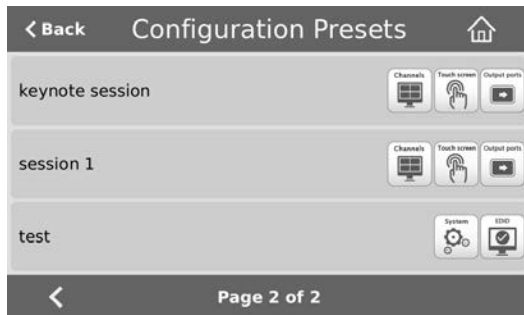
4. Click **OK** when prompted to apply the configuration preset. If the configuration preset includes the network or system configuration groups, a reboot is required.
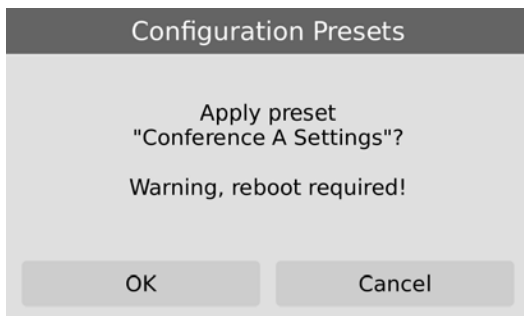
Alternatively, you can apply a configuration preset from the **Settings** when you choose **Network**, and then tap **Network Presets** to display the list of saved configuration presets that you can choose from. Configuration presets that contain only the network configuration group are listed when you use this method.
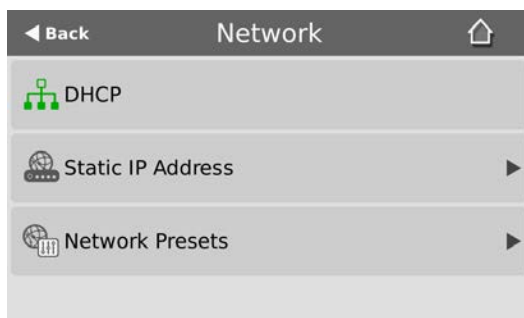
Export and import configuration presets

You can download configuration presets to your local computer, then upload and apply the preset to other Pearl Mini systems or save the configuration preset as a backup of your current configuration. Either way, it's a simple two-step process to download the preset from one system and upload it to another.

> Uploading a preset does not apply immediately. You must still apply the preset using **Apply a configuration preset using the touch screen** or **Apply a configuration preset using the Admin panel**.

Download a configuration preset

To download or export a configuration preset:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, Click **Maintenance** . The maintenance page opens.

3. In the **Configuration presets** section, click the **Download** button next to the configuration preset you want to export. The configuration preset file (with extension .preset) is saved to your admin workstation (in your browser's download folder).
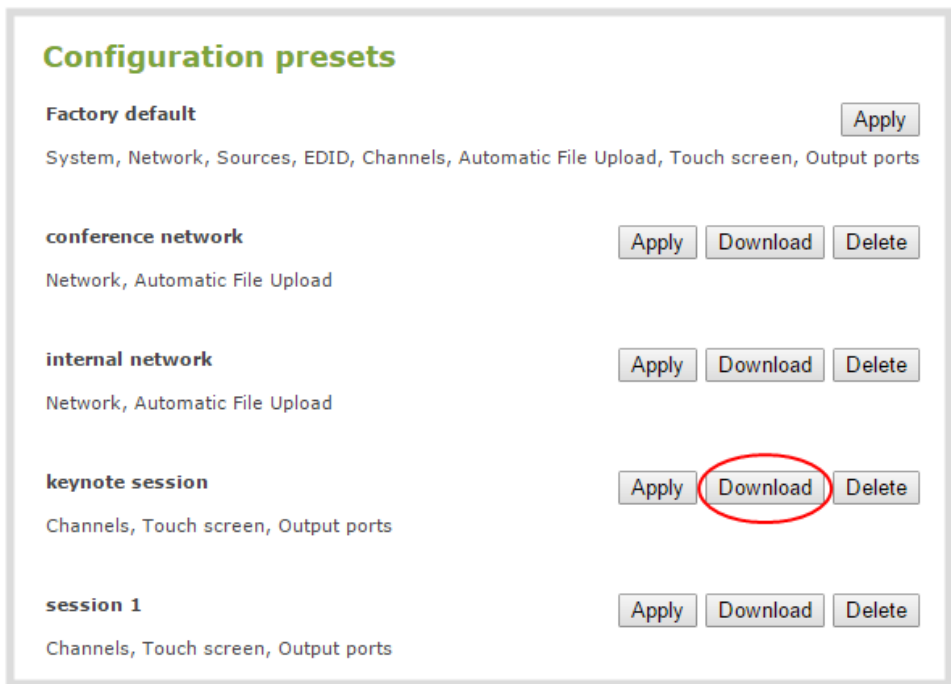
Import a configuration preset

To import a configuration a preset:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Maintenance**. The maintenance page opens.

3. In the **Import configuration preset** section, click **Choose file** and browse to select the file you want to upload (with the extension .preset), then click **OK**.

4. Click **Import**.
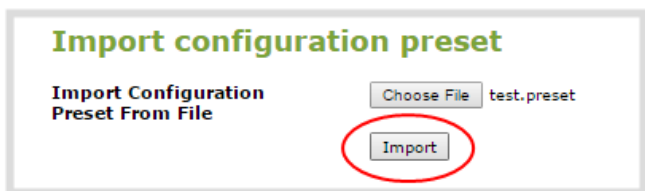
5. If your system already has a configuration preset with the same name as the one you're loading, a warning is shown. Click **OK** to overwrite the existing preset or **Cancel** to cancel the upload.

> The page at 192.168.0.129 says: ✕
>
> configuration preset test already exists. do you want to overwrite it?
>
> ☐ Prevent this page from creating additional dialogs.
>
> **OK**   Cancel
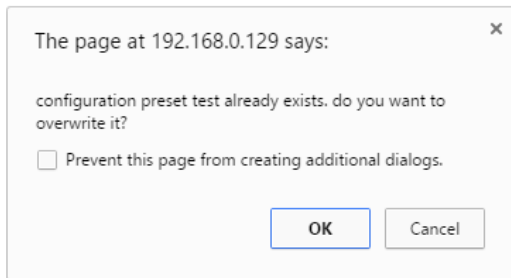
> When a configuration preset file is uploaded it is not applied. To apply the configuration preset. See **Apply a configuration preset using the Admin panel** or **Apply a configuration preset using the touch screen**.

Update a configuration preset

To update a configuration preset and add or remove different configuration groups using the Admin panel, you simply creating a new configuration preset with the same name so that it overwrites the existing one.

To update a configuration preset:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Maintenance** . The maintenance page opens. All existing configuration presets are listed in the **Configuration presets** section.

Configuration presets

Factory default   [Apply]
System, Network, Sources, EDID, Channels, Automatic File Upload, Touch screen, Output ports

conference network   [Apply] [Download] [Delete]
Network, Automatic File Upload

internal network   [Apply] [Download] [Delete]
Network, Automatic File Upload

keynote session   [Apply] [Download] [Delete]
Channels, Touch screen, Output ports
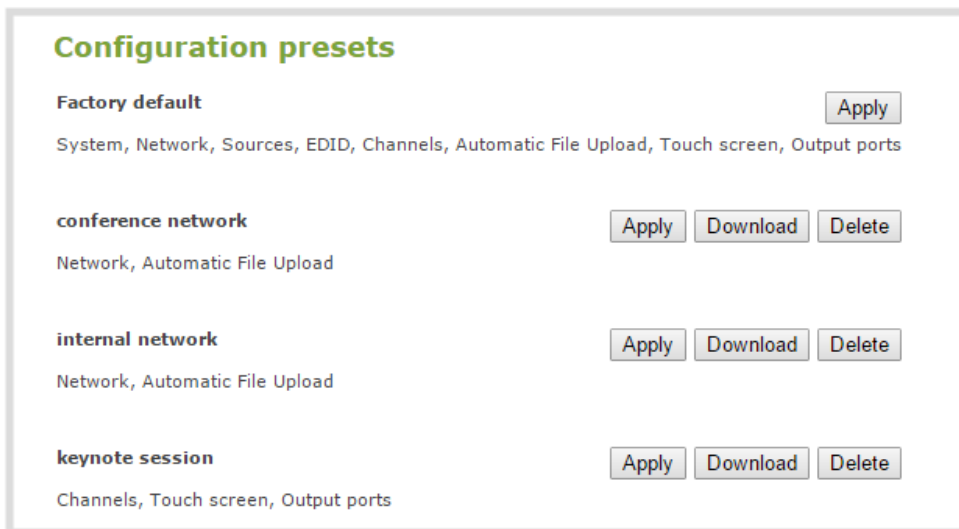
3. Copy the name of the preset you want into the **Name** field and select the configuration groups to include, then click **Save**.

4. Click **OK** when prompted to overwrite the existing configuration preset with the new one.
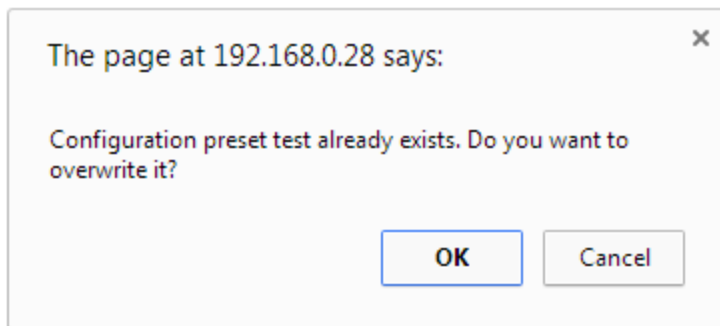
Delete a configuration preset

You can delete all configuration presets at once by doing a factory reset, or you can delete individual configuration presets from the **Maintenance** page. You cannot delete the Factory default configuration preset.

To delete a configuration preset:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Maintenance**. The maintenance page opens.

3. Click **Delete** beside the configuration preset that you want to delete, and then click **OK** when prompted.

The page at 192.168.0.28 says:

Are you sure you want to delete configuration preset test?

OK   Cancel
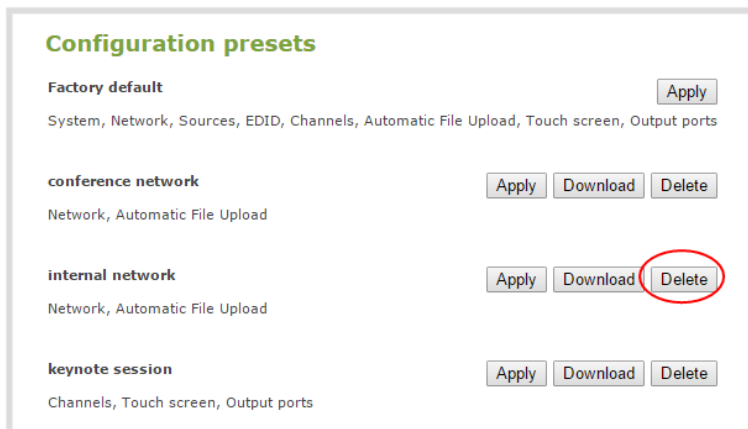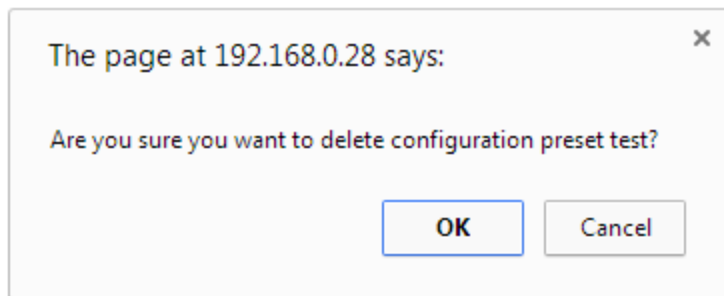
User administration

Pearl Mini has three configured users: admin, operator, and viewer. By default, none of these users have passwords assigned. For security purposes you should add passwords to the admin and operator accounts.

Topics include:

- User types and privileges
- Set or change user passwords
- Remove user passwords
- Overcome lost passwords
- Configure LDAP user authentication
- Change the logged-in user
- Restrict viewers by IP address

User types and privileges

There are three Pearl Mini user levels:

- Administrator
- Operator
- Viewer

You cannot change the default log in user name for the user levels or disable user levels. No password is assigned to user levels by default. We recommend that you assign passwords to the Administrator and Operator levels because they have access to the Admin panel and can reconfigure Pearl Mini, see Set or change user passwords. Individual users do not have their own private profiles with individually set passwords.

When logged in to the Admin panel, the user level is displayed at the top right corner of the screen.
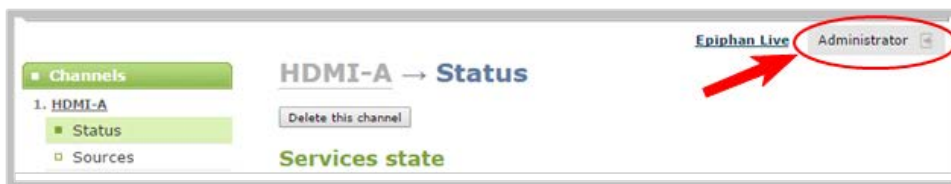
Administrator

The **admin** account is used for all system configuration and has full access to all configuration features. The default user name used to log in to Pearl Mini is **admin**.

Operator

The **operator** account allows users limited Pearl Mini configuration control. The default user name used to log in to Pearl Mini is **operator**.

Operators can to do the following:

- Configure inputs
- Control recordings (start and stop)
- Rename, download and delete recordings
- Switch layouts while live streaming
- Perform network diagnostics.

If an operator does not have the privileges to apply a particular configuration in the Admin panel, the **Apply** button appears grayed-out in color and is not clickable.
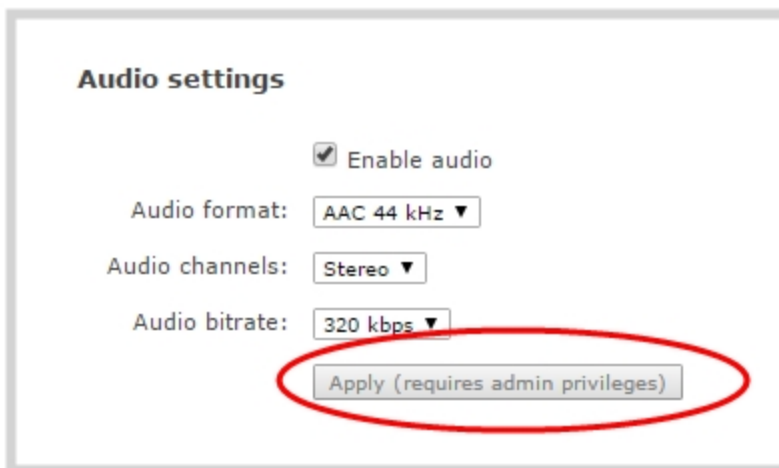
Viewer

The **viewer** account is for all users who are permitted to view the streamed channels. The default user name used to log in to Pearl Mini is **viewer**. If no password is assigned, then viewers are not prompted for a user name and password to view a channel. The viewer user name and password prompt appears only if a viewer password is set.

In addition to the global viewer account, each channel can set a viewer password that overrides the global value, see Restrict viewer access to channel streams.

User privileges

The following table outlines the privileges for each user level:

Table 23 *User privileges in the Admin panel*

Action or Menu Option	viewer	operator	admin
View Channel Output	✓	✓	✓
Channel Operations			
View Channel Configuration		✓	✓
Rename a Channel			✓
Configure Stream Channel			✓
Configure Stream Sources			✓
Publish a Stream			✓
Configure Branding for a Channel			✓
Switch Layouts while Streaming/Recording		✓	✓
Start the Stream Recorder		✓	✓
Stop the Stream Recorder		✓	✓
View Recorded Files List		✓	✓
Rename Recorded Files		✓	✓
Download Recorded Files		✓	✓
Delete Recorded Files		✓	✓
Source Operations			
View Source Configuration		✓	✓
Rename Source			✓
Configure Source		✓	✓

Action or Menu Option	viewer	operator	admin
View Source Snapshot		✓	✓
System Configuration Operations			
View System Configuration		✓	✓
Configure Automatic File Upload			✓
Select External USB Drive Behavior			✓
Configure FTP Server			✓
Configure UPnP Sharing			✓
Configure Network Address			✓
Configure USB Tethering			✓
Perform Network Diagnostics		✓	✓
Configure Date and Time preferences			✓
Set or Change User Passwords			✓
Configure the Touch Screen			✓
Configure Serial Port Flow Control			✓
Upload Branding Images			✓
Upload Branding Templates			✓
Select Branding Template			✓
Enable Remote Support			✓
Backup Device Configuration			✓
Restore Device Configuration			✓
Restore Factory Configuration			✓
Reboot Device (via Admin panel)			✓
Shutdown Device (via Admin panel)			✓
Configure Time Until Next Disk Check			✓

Action or Menu Option	viewer	operator	admin
Perform Disk Check			✓
View Disk Information		✓	✓
Upgrade Firmware			✓
View System Information		✓	✓

Set or change user passwords

The admin, operator, and viewer level users have no assigned password by default. We recommend that you assign passwords for both the admin and the operator levels because both can access to the Admin panel. Contact your system administrator for your organization's specific password requirements.

Passwords are case sensitive and can use all alpha-numeric keys in the ASCII range. Your password can be up to 255 characters long, but should not include any spaces.

> If the admin password is defined and the operator password is undefined, by default the operator must use the admin password.

In addition to setting global passwords for viewers, you can also set access passwords and IP restrictions on a per-channel basis from the channel's **Streaming** page, see Restrict viewers by IP address.

If you lose the admin password, see Overcome lost passwords.

> **STOP** Setting a user's password causes the user to be logged out. Be ready to log back in with the new admin password or have operators and viewers log in with the appropriate new password. Viewers may need to refresh their browser window or press play in their media player.

> **STOP** Changing the admin password while live streaming disrupts the view of the stream for viewer-level users. Complete any admin password changes when there is no live stream in progress.

To set a user password:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, select **Access passwords**. The password configuration page opens.
3. Highlight and delete the **current password** for your selected user. Eight dots mask the password regardless of the password's actual length (and appears even if no password is set).

4. Highlight and delete the **confirmation password** for the selected user.

5. Select the user's **password** field and type a new password for the user. The new password must have between 1-255 alpha-numeric characters or special characters with no spaces. Passwords are case sensitive.

6. Select the user's **password confirmation** field and confirm the new password.

7. Click **Apply**.

8. If you were logged in as the user whose password you just changed, you are logged out and must log back in with the new password. If you added or changed the viewer's password, all viewer's stream will pause until they log in with the new password.

You can specify multiple account passwords before clicking **Apply**.

Remove user passwords

You can remove passwords for one or more of the user levels using the Admin panel. If you don't remember the admin password, refer to the section Overcome lost passwords. Note that viewer passwords can be set on a per-channel basis.

> **STOP** Clearing a user's password will cause that user to be logged out. Be ready to log back in with the new admin password. If viewers are watching the broadcast when the viewer password is cleared they will be logged out. Viewers may need to refresh their browser window or press play in their media player to trigger the login prompt.

To clear a user's password:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Access passwords**. The password configuration page opens.

3. Highlight and delete the current password for the selected user level. Eight dots mask the password regardless of the password's actual length (and appears even if no password is set).

4. Highlight and delete the **confirmation password** for the selected user, then click **Apply**.

5. If you were logged in as the user whose password you just cleared, you are logged out and must log back in without a password. If you cleared the viewer's password, all viewer streams will pause until they log in without a password.

To clear a user's password on a specific channel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channel menu, select a channel and click **Streaming**. The channel's Streaming configuration page opens.

3. From the Access control section, do one of the following:

    a. Clear the **viewer password** field.

    b. Select **Use global settings** from the access control drop down.

4. Click **Apply**.

Overcome lost passwords

If you have lost the password for the operator or viewer account, you can log in to the Admin panel and reset the password using the procedure described in Set or change user passwords.

If you have lost the admin password and you have remote support enabled on the system, contact Epiphan Support to request a remote password reset. If remote support is disabled, you must return the system to Epiphan for password recovery. Contact Epiphan Support.

Alternatively, you can regain access to Pearl Mini if you apply the factory default configuration preset using the touch screen, Apply a configuration preset using the touch screen. The factory default configuration will change the current settings on Pearl Mini, see The Factory default configuration preset.

Configure LDAP user authentication

You can use the Lightweight Directory Access Protocol (LDAP) to authenticate users. Specify user roles by using group DNs for users who log in as an Administrator, Operator, or as a Viewer.

The system has only **one** admin user and **one** operator. LDAP users must log in as either an admin or an operator and do not have their own private profiles. Any LDAP users with the name admin, operator, or viewer are ignored and the local accounts are used instead.

When enabled, LDAP authentication is an **alternative** to the regular system user names and passwords. You may still login as **admin**, **operator** or **viewer** using the passwords for those accounts.

> LDAP replaces the local **viewer** account instead of working side-by-side with it when LDAP is enabled and the viewer account has no password (either there is no global viewer password configured or the channel overrides the global password with a blank password). In this case, the viewer must authenticate with LDAP and **cannot** use the default **viewer** account with a blank password to log in.

> 🛑 For security reasons, you should configure passwords for the local accounts. See **Configure LDAP user authentication**.

These instructions assume you have a pre-configured LDAP server. The server must support anonymous binding or have a special bind account with search access privileges. Note that Active Directory does not support anonymous binding. LDAP referrals, restrictions and failovers are not supported.

To configure LDAP authentication:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Access passwords**. The password configuration page opens.

3. In the **LDAP authentication** section, check **Enable LDAP authentication**. Uncheck the check box to disable LDAP authentication.

4. In the **Server address[:port]** field, enter the server IP address and (optional) port for your LDAP server. For example, 192.168.1.101:389.

5. In the **Connection encryption** drop-down, choose the type of encryption used by your LDAP server (if any is used).

Connection encryption	Description/Default port used
No Encryption	No encryption is used to connect to the LDAP server. The default port is 389.
SSL	SSL encryption is used to connect to the LDAP server. The default port is 636.
TLS/STARTTLS	The connection is initially unencrypted then upgraded to TLS encryption is used. The default port is 389.

6. In the **Bind DN** and **Bind password** fields, specify the fully qualified DN and password for LDAP bind. These fields are only needed if your LDAP server does not support anonymous binding.

7. In the **Base DN** field, specify the baseObject to search for entries. The system will search this object and the whole subtree starting at the base DN.

8. (Optional) By default the search attribute is *uid*, which is suitable for a unix environment. You can specify a different value in the **Search attribute** field, if needed. For Active Directory environments, specify *userPrincipalName*. The value of this attribute must be unique in the Base DN.

9. In the **Administrators (group DN)** field, specify the distinguished name of the group users must be part of to be logged in as the administrator. Users must have the *member* or *unqueMember* attribute for the specified group to be granted Administrator access.
If left blank, LDAP is not supported for Administrators (but can still be used for Operators and Viewers).

10. In the **Operators (group DN)** field, specify the distinguished name of the group users must be part of to be logged in as the operator. Users must have the *member* or *unqueMember* attribute for the specified group to be granted Operator access.
If left blank, LDAP is not supported for Operators (but can still be used for Administrators and Viewers).

11. In the **Viewers (group DN)** field, specify the distinguished name of the group users must be part of to be logged in as a viewer. Users must have the *member* or *unqueMember* attribute for the specified group to be granted Viewer access.
If left blank, LDAP is not supported for Viewers (but can still be used for Administrators and Operators).

12. Click **Apply**.

When a user of the LDAP server next visits the admin or viewer page for the system, the system prompts for use the username and password. For ActiveDirectory servers, the user needs to enter his fully qualified username (i.e. username@domainname) in addition to his LDAP password.

> 🛑 Users are required to authenticate once to the system and one time per channel they view. Therefore users see a prompt to log in to the system (the system name is shown) and a second time to log in to the channel (the channel name is shown).

Change the logged-in user

After you log in to the Admin panel as an Administrator or Operator, your browser remembers this configuration and automatically logs you in using the same user account the next time you log in to Pearl Mini.

To log in using a different user account:

1. In the Admin panel, click the logout icon at the top right corner of the screen. A new login screen appears.
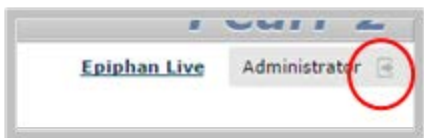
> 📋 **Some browsers may require you to click twice before the you are logged out.**

2. Enter the credentials that you want to use to log in to the Admin panel.

Restrict viewers by IP address

Pearl Mini permits you to restrict which computers can access broadcasts by building a list of allowed and denied IP addresses. You can do this at a global level for the system and can also override these settings on a per-channel basis. Both global and per-channel configuration procedures are described.

The following table describes what happens when an IP address is added to the allowed and denied IP address lists.

Item	Description
Allow IP's	Users connecting from addresses in this list are permitted to view broadcasts from the system, provided their IP address is not in the Deny IP's list. To allow all except IP addresses in the deny list, if any, leave the field blank. You can use the Allow list by itself, or in conjunction with the Deny IP's list as an exception to a rule in the allow list.
Deny IP's	Users connecting from addresses in this list are not allowed to view broadcasts from the system, unless their IP address is in the Allow IP's list. If a specific IP address is in both lists, access to the stream is denied. You can use the Deny list by itself, or in conjunction with the Allow IP's list as an exception to a rule in the allow list.

If your viewer account has a password, your viewers must connect to the system from a computer (or gateway) with a permitted IP address and must also supply the user name (viewer) and password before they can view the broadcast.

To restrict access by IP address, you need to know the IP addresses or range of addresses for your viewers. By default, all IP addresses are allowed to connect to the broadcast.

If a user attempts to connect to the stream from a disallowed IP address, access is denied. If there's an attempt to connect using a web browser, the message "IP address rejected" is displayed.

Table 24 *IP Based Restriction Options*

If you're not familiar with creating allow/deny lists, see IP restriction examples.

> 📋 IP address restriction is valid for the viewer only and does not affect the Admin panel or the mobile configuration interface.

To restrict viewer access to watch streams for all channels by their IP address:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Access passwords**. The password configuration page opens.

3. Enter the allowed IP addresses or address ranges in the **Allow IP's** field and enter denied IP addresses or address ranges in the **Deny IP's** field. Separate addresses with a comma. To specify a range, use a hyphen (-). Optional spaces improve readability.

4. Click **Apply**.

To restrict viewer access to watch streams on a specific channel by their IP address:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Streaming**. The channel's streaming configuration page opens.

3. From the **Access Control** drop-down, select **Use these Settings** to enable local password and Allow/Deny IP lists are enabled.

4. (Optional) Enter a password for the viewer in the **Viewer Password** field.

5. Enter the allowed IP addresses or address ranges in the **Allow IP's** field and enter denied IP addresses or address ranges in the **Deny IP's** field. Separate addresses with a comma. To specify a range, use a hyphen (-). Optional spaces improve readability.

6. Click **Apply**.

IP restriction examples

The following table lists some example allow lists.

Table 25 *Example allow lists*

Example	Description
Allow list with distinct IP addresses	The simplest allow/deny list is to use the list of known IP addresses to craft a list of allowed IP addresses. All other addresses are denied access to the broadcast.

Example	Description
	For example if your system is accessible on your local area network (LAN) and you want to make sure only the CEO's specific desktop, laptop and tablet computers (with IP Addresses 192.168.1.50, 192.168.1.51, and 192.165.1.75, respectively) can connect to the broadcast, construct the following allow list: Allow: 192.168.1.50, 192.168.1.51, 192.168.1.75
Allow list with a range of IP addresses	Sometimes you'll want a range of computer IP addresses to connect to your system. This may happen when you have one range of IP addresses assigned to desktop computers (i.e. in the range 192.168.1.1 to 192.168.1.100) and another range assigned to boardroom computers (i.e. the range 192.168.1.200 to 192.168.1.250). If you only want the boardroom computers to connect to broadcasts from the system you can specify the range of boardroom IP addresses rather than needing to type in each individual address. The allow list looks as follows: Allow: 192.168.1.200-192.168.1.250 Note that we could have specified two of the IP addresses in the previous example as a range.
Allow list with a range of IP addresses and one or more specific IP addresses	Putting the first two examples together, we want to permit access to IP addresses in the range of boardroom computers (192.168.1.200-192.168.1.250) and also want to add the desktop, laptop and tablet computers of the CEO (IP addresses 192.168.1.50, 192.168.1.51, and 192.168.1.75, respectively). Note the first two IP addresses are consecutive, so they can be added as a second range. Add these IP addresses to the list as follows: Allow: 192.168.1.200-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75 Your list can have multiple ranges and multiple distinct IP addresses, provided they are separated by commas.
Allow list with a range of IP addresses, distinct	Building on the previous examples, consider a situation where you want the CEO's computers (192.168.1.50, 192.168.1.51, 192.168.75) and all

Example	Description
IP addresses, and an exception	boardroom computers (192.168.1.200-192.168.1.250) to access the broadcast, with the exception of the public boardroom computer (192.168.1.211). Use both allow and deny lists to create the rule as follows: Allow: 192.168.1.200-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75 Deny: 192.168.1.211 Both lists can have multiple ranges and multiple distinct IP addresses, provided they are separated by commas.

The following table lists some example deny lists.

Table 26 *Example deny lists*

Example	Description
Deny list with distinct IP addresses	Another simple allow/deny list is to use the list of known IP addresses to list specific denied IP addresses. All other addresses are allowed access to the broadcast. For example imagine your system is accessible on your local area network (LAN) and you want to allow any computer on the LAN can access the stream except your publicly-accessible boardroom (with IP address 192.168.1.211). You can use the following deny list (leave the allow list empty) to permit all computers except the boardroom computer: Deny: 192.168.1.211 As with allow lists, your deny list can specify a range of IP addresses, and can specify multiple ranges or distinct IP addresses in a comma-separated list.
Deny list with a range of IP addresses	Consider a situation where you want every computer on the network to access the broadcast, with the exception of the CEO's desktop, laptop and tablet computers. Additionally, boardroom computers should not be permitted with the exception of the cafeteria computer (IP address 192.168.1.222). The deny list is an "exception" list for the allow list. So to craft the rule described above we need to allow all the computers in the local subnet, then

Example	Description
	deny specific sub-ranges including two groups of boardroom computers ensuring the cafeteria computer's IP address is not in the deny list: Allow: 192.168.1.1-192.168.1.250 Deny: 192.168.1.200-192.168.1.221, 192.168.1.223-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75

Status and monitoring

Pearl Mini lets you monitor audio and check the status of your channels, live streams, and recordings.

Topics include:

- Monitoring audio
- Channel monitoring using the touch screen
- View system information using the touch screen
- View system information using the Admin panel
- View the video output port status
- View AFU status

Monitoring audio and VU sensitivity

You can connect headphones or external speakers to the 3.5 mm audio jack on the front panel of Pearl Mini. To monitor the audio for a specific channel, just select the channel using the touch screen. The audio you hear depends on which layout is currently live because different layouts can have different audio sources configured. To adjust the volume, tap the headphones icon using the touch screen. See Monitoring audio for details.

A VU meter on the touch screen shows the audio levels for the selected channel. The value is displayed in dBFS (decibels relative to full scale). Colored bars represent the audio level.

Table 27 *Audio VU meter levels*

Color	Decibel range
Red	0 to -9 dBFS
Yellow	-9 to -18 dBFS
Green	-18 dBFS and lower

Channel monitoring using the touch screen

Have complete confidence about what you're capturing, streaming, and recording. All the channels you have configured are displayed in the grid view.

The grid view opens by default when you turn on Pearl Mini. If necessary, tap the touch screen once to turn it on and tap again to display the controls.
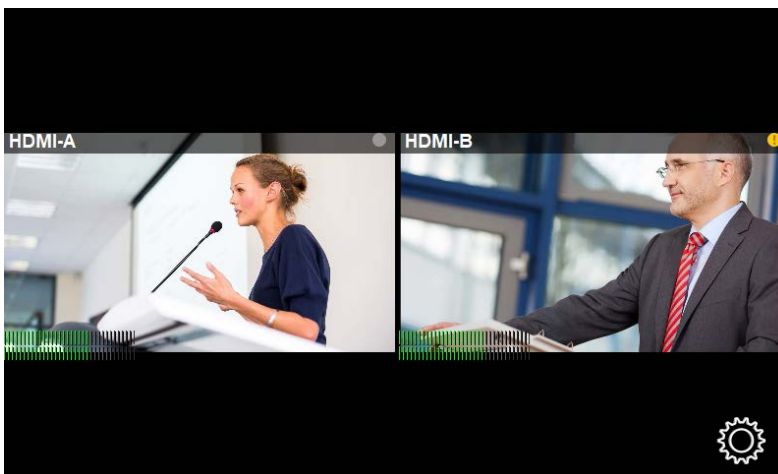
Table 28 Grid view indicators

Item	Description
Streaming and recording indicators	Streaming (left) and recording (right) indicators appear in the top-right corner for each channel: (no dots) Streaming is disabled and recording is stopped. Streaming is stopped and recording is stopped. Streaming is started and recording is stopped. Streaming has an error and recording is stopped. Streaming is stopped and recording is started. Streaming is started and recording is started. Streaming has an error and recording is started. Streaming is disabled and recording is started. **TIP**: You stop and start recording from the individual channel view.
Audio VU meter	Each channel has an audio VU meter that uses quasi-peak ballistics with samples

Item	Description
	averaged every 10 ms. The maximum average audio level in each 100 ms period is displayed using colored bars. • RED = 0 to -9 dBFS • Yellow = -9 to -18 dBFS • Green = -18 dBFS and lower

You can do more monitoring for a specific channel when you select a channel from the grid view. Just tap the channel you want to monitor from the grid view and the channel view opens.
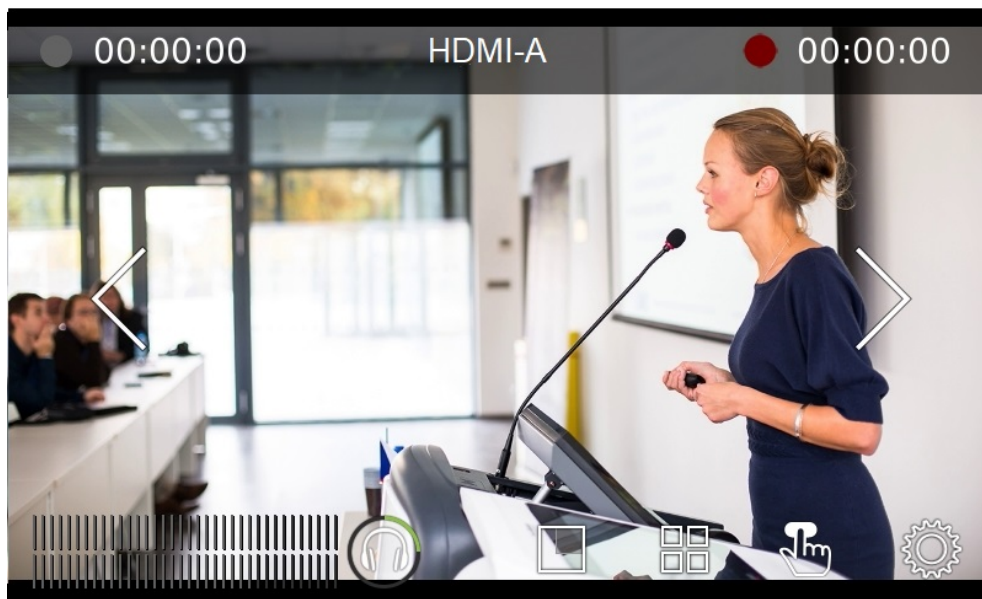
Table 29 *Individual channel view indicators*

Item	Description
Streaming status	Streaming indicator appears in the top-left corner: (no dot) Streaming is disabled. ⬤ Gray means streaming is stopped. ⬤ Flashing blue means streaming is in progress. ⚠ Streaming has an error.
Streaming timer	The streaming timer shows the length of time that streaming has been in progress.

Item	Description
Recording status	Recording indicator appears in the top-right corner: (no dot) Recording is disabled. ⬤ Gray means recording is stopped. 🔴 Flashing red means recording is in progress. ⚠️ Recording has an error.
Recording timer	The recording timer shows the length of time that recording has been in progress.
Audio VU meter	Audio VU meter for the channel uses quasi-peak ballistics with samples averaged every 10 ms. The maximum average audio level in each 100 ms period is displayed using colored bars. • RED = 0 to -9 dBFS • Yellow = -9 to -18 dBFS • Green = -18 dBFS and lower

To monitor a different channel, tap the right or left arrows on the channel view to see the next (or previous) channel. If the touch screen controls aren't showing, tap anywhere on the touch screen to make them reappear.

To get back to the grid view, tap the grid icon ⊞.

View system information using the touch screen

Find the serial number, check the installed firmware version of your Pearl Mini and more on the System Status screen using the touch screen.

The System Status screen displays basic system information that's useful when first setting up your Pearl Mini.

Label	Description
1	Device Information • Serial number • Video grabber number • Firmware version
2	Network Information • IP Address • MAC Address
3	Device Status • System date • System time • Uptime • Temperature in degrees Celsius
4	Storage Information (when available) • Disk space available • Pictogram of available disk space

To open the System Status screen:

1. Tap the **gear** icon. If the control icons aren't showing, tap anywhere on the touch screen.

2. Tap **System Status** to see the System Status page.
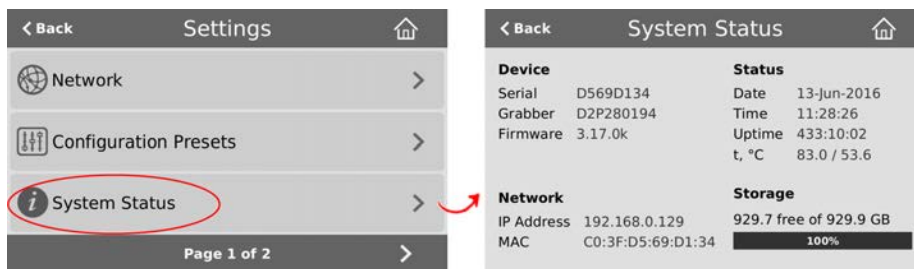
3. Tap **Back** to return to the **System Settings** screen, or the **Home** icon to return to the channel view.

> If the system settings control icon won't appear when you tap the touch screen, it may be disabled. See **Configure the touch screen** to enable system information.

View system information using the Admin panel

Get useful information about your Pearl Mini and configured channels from the system information page. You can view your current firmware level, the system hardware version (if available), and currently configured channels.

To view system information using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Info**. The system information page opens.

Pearl Mini GSEA170202 info

Status

Date:	Tue Apr 03 2018
Time:	12:33:46 GMT-0400 (Eastern Daylight Time)
Uptime:	1:39:53
System load:	34%

Firmware

Version:	4.5.0h
Revision:	41453_1797
Date:	2018-04-02

Hardware

CPU board: PearlMini (Rev 1)

Channels

#	Channel name	Status	Video input	Audio input	Stream	Bitrate	Actual bitrate	Frame size	FPS / Actual FPS	Port	
1	HDMI-A	ok	HDMI-A	HDMI-A Audio	H.264+AAC	auto	5951 kbps	1920x1080	30 / 30.000	8000	View
2	HDMI-B	ok	HDMI-B	HDMI-B Audio	H.264+AAC	auto	5962 kbps	1920x1080	30 / 30.000	8001	View

View the video output port status

The current status of the video output port and attached video display appears at the top of the video output port configuration page. You can view the status using the Admin panel.

To view the video output port status:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Output ports menu, click the output port (**HDMI 1**). The video output port configuration page opens.

Table 30 *Possible video output status messages*

Message	Description
Disabled	This video output port is disabled in the configuration. See View the video output port status.
Display is not connected	There is no display connected to the video output port or the connected display is not powered on or not functioning.
Source is currently unavailable	The video output port is configured to display a channel that no longer exists. Change the source. See View the video output port status.
Starting …	The video output port is configuring the display and will shortly output the first frame.
Running at w×h	The video output port is functioning at the specified resolution.

> You can also view video output status using the Epiphan Live control interface. See **Monitor and setup the output port source and audio** for more information.

View AFU status

You can view basic Automatic File Upload (AFU) information from your Pearl Mini's touch screen.
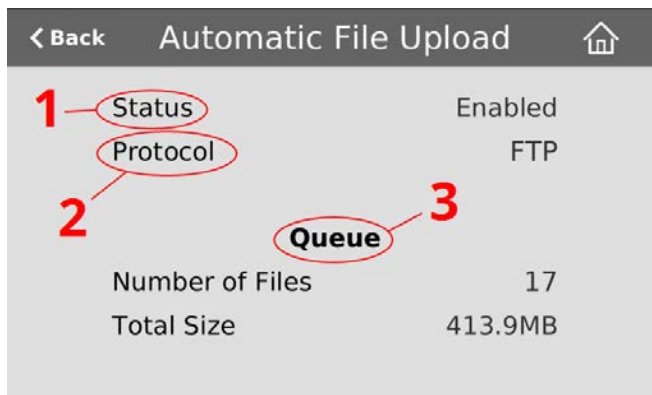
See File and recording transfer to learn how to configure AFU settings using the Admin panel.

Table 31 *AFU status touch screen components*

Label	Name	Description
1	Status	Indicates the AFU status: • Enabled • Disabled • Waiting – files are in queue to be transmitted for upload according to specified time interval – within the next 6, 12 or 24 hours. See Enable AFU and set parameters • Error – an error has occurred with the AFU
2	Protocol	Provides the configured AFU protocol: • FTP • RSYNC • CIFS • SCP • SFTP • AWS S3 Client • WebDav • External USB drive
3	Queue	Displays the number of files currently in the AFU queue and the total file size.

To access the Automatic File Upload status using the touch screen:

1. Tap the **gear** icon. If the control icons aren't showing, tap anywhere on the touch screen.

 If the gear icon is not visible on the touch screen, tap the screen once to activate the control buttons. If the system settings button is still not visible, it is disabled in the system's touch screen configuration. See **Configure the touch screen** to enable system information.

2. Tap the arrow icon in the lower-right corner of the screen to go to the second Settings page.
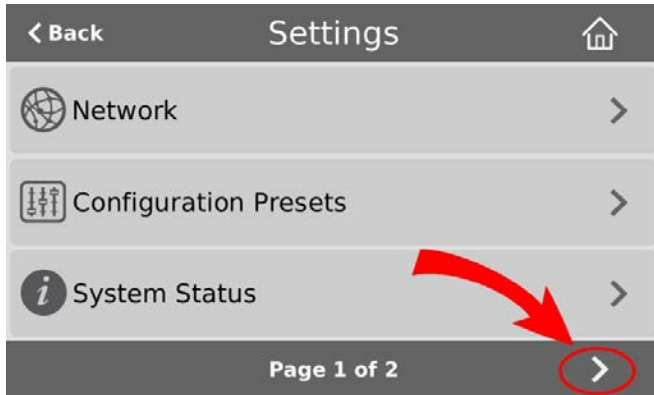
3. Tap **Automatic File Upload** to display the AFU Status page.
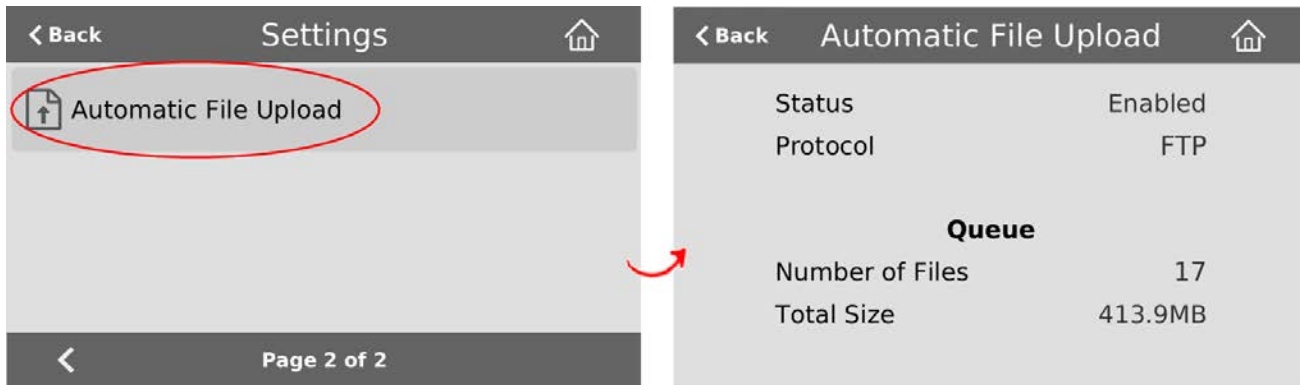
To close the system information screen, tap **Back** in the upper-left corner of the screen to return to the **System Settings** view, or tap the **Home** icon to return to the channel view.

PART 2: Capture

Capturing is the process of taking the signals from your video and audio sources and encoding them so they're ready for streaming and recording. You add the captured video and audio to channels, which you customize for live streaming, switching, and recording.

This section covers how to create channels and add custom layouts so that you can capture, stream, and record exactly what you want - how you want! Whether that's a simple channel with a single video and audio source or channels that have multiple video and audio sources and custom layouts like picture in picture.

Topics include:

- What is a channel?
- Channel layout examples
- Channel configuration
- Custom layout configuration
- Video and audio input sources

What is a channel?

Your video and audio sources that are connected to the input ports on Pearl Mini can be combined and added to channels, which you can stream and record. A channel is essentially an encoding instance that you associate with your video and audio inputs to produce outputs such as video recordings and streaming destinations. We recommend configuring up to two channels for best performance.

Pearl Mini comes with two channels already preconfigured: HDMI-A and HDMI-B. The HDMI-A video input port on Pearl Mini is assigned to the HDMI-A channel and the HDMI-B video input port is assigned to the HDMI-B channel by default. But you can easily change that and add whichever video and audio sources you want to a channel. You can even change the name of the channel using the Admin panel.

You can pick and choose which channels to record, stream, or do both at the same time! You can even choose the output from one channel as the video input source for another channel.

Channels with multiple layouts

There are many creative ways to customize your channels in Pearl Mini. Easily combine multiple video sources to the same layout for picture in picture or side-by-side layouts using the convenient custom layout editor. You can add text overlays and effects, like transparent logos and lower thirds. Customize your channels with images, company information, corporate colors, and time stamps just to name a few possibilities.

When you use the custom layout editor to create multiple layouts in a channel, you can live switch between the different layouts while recording, streaming, and displaying the channel on a confidence monitor. You're not limited to creating single-source **Channels** that are a one-to-one reflection of your **video inputs**. And if you need to output your switched program using multiple encoding settings, you can use the output from one channel as the input source for another channel, then stream and record each channel at different encoding settings.

Each channel can include some or all of your video and audio sources. And you can add the same source to as many different layouts as you want in a channel.

> For example, you could use the same source in all of these situations at the same time:
>
> - in Channel 1 as part of a multi-source layout with picture in picture at 1080p, 30 fps, 6,000 kbps
>
> - as the only source in Channel 2 at 720p, 30 fps, 2,000 kbps

To create custom layouts, see Custom layout configuration and About the custom layout editor.

Important note for channels with multiple layouts

The two default channels are named HDMI-A and HDMI-B. Each has a default layout with the corresponding HDMI-A (or HDMI-B) video and audio sources already assigned. By default, when a channel includes only one layout that has a single video source, the default channel name is assigned the name of the video source.

When you add a second layout to the channel, the channel name automatically changes to a generic name **Channel X**, where *X* is the channel index number. For example, HDMI-A changes to Channel 1.

Changing the channel name affects system operation.

- If the channel is streaming, the stream is stopped and restarted.
- If the channel's recorder is recording, then recording is stopped and a new file is started.

If you delete all the layouts in a channel until there is only one layout left and that layout has only one video source assigned, then the channel name changes back to the name of the video source. For example, Channel 1 changes to HDMI-A

To avoid channel name changes, we recommend that you rename the channel to a custom name. Changing the channel name to a custom name ensures that no automatic channel renaming happens, see **Rename a channel**.

Channel layout examples

Here are some examples of different layouts you can create using the custom layout editor with just two video input sources and two media image files.

Layout example	Description
	One video source (a slideshow presentation in this case), at the full size of the channel. **To get this look:** Using the custom layout editor, add one video source to the layout, select **keep aspect ratio** and stretch to fill the entire layout area.

Layout example	Description
	One video source (a slideshow presentation in this case), with a green background matte. **To get this look**: Using the custom layout editor, select a background color. Add a video source to the layout and size appropriately, leaving the background matte visible.
	One video source with a logo (.png with transparency) in the bottom left corner. **To get this look:** Upload an image with transparency. Using the custom layout editor, add one video source to the layout, select **keep aspect ratio** and stretch to fill the entire layout area. Then, add the image to the layout and drag it where you want it to appear on screen.
	One source with a text overlay in the bottom right corner. **To get this look:** Using the custom layout editor, add one video source to the layout, select **keep aspect ratio** and stretch to fill the entire layout area. Then, add a text overlay to the layout and drag it where you want it to appear on screen.

Layout example	Description
	Two video sources (one cropped to a new aspect ratioCrop a video source), a background image, and a logo. Make sure the background image has the correct aspect ratio. **To get this look:** Upload your background and logo images (you can do this from the Media page or the Layouts page for the channel). Using the custom layout editor, add the background image to the layout and stretch it to fill the entire layout area. Then add your two video sources to the layout, adjusting their size and position as needed. Lastly, add the logo to the layout and move it in to position. For the second video source, use the **Crop tool** to crop the second source to a square aspect ratio.

Examples including a 4x3 video source.

Layout example	Description
	One 4x3 video source at the full size of the channel. **To get this look:** Using the custom layout editor, add one video source to the layout, select **keep aspect ratio** and stretch to fill the entire layout area. The channel broadcasts in 4x3 if you have **Use current signal resolution as frame size** selected on the encoding page.

Layout example	Description
	One 4x3 video source in a 16x9 frame with a green background matte. **To get this look**: From the Encoding page for the channel, make sure that the 16x9 frame size is selected. Then using the custom layout editor, select a background color. Add a video source to the layout and stretch to the full height of the screen, leaving the background matte visible.
	One 4x3 video source and a cropped 16x9 video source together with a background image. Make sure the background image has the correct aspect ratio. **To get this look:** Upload your background image (you can do this from the Media page or the Layouts page for the channel). Follow the steps from the first 4x3 example to add the video sources, then use the **Crop** tool to crop the second source to a square aspect ratio.

Channel configuration

Channels let you encode your video and audio sources so they can be live streamed, recorded, and switched if you create multiple layouts using the custom layout editor. Before using a channel, you should check the channel settings. You can fine-tune your channel to maximize the quality of your live streams, minimize the amount of bandwidth used, and ensure your video and audio encoding settings are optimized for your event. You can control exactly how the video is presented and streamed to shared destinations and multiple viewers.

> If you're planning to do live switching with your channel, we recommend you set the frame size to a fixed size instead of using the default setting. The default setting automatically sets the channel frame size to match the frame size of the video source. Changing the frame size to a fixed value ensures that you don't experience any stream interruptions if the frame size of the video source changes, like when switching between different layouts that contain a single video source with different frame sizes.

Topics include:

- Create a channel
- Add video sources or a channel as a source
- Add an audio source to a layout
- Duplicate a channel
- Rename a channel
- Delete a channel
- Preview channel
- Add or remove channel metadata
- Configure channel encoding
- Codecs and file format compatibility
- Configure video encoding
- Configure audio encoding
- Multi-encoding and channel as a source

Create a channel

You create channels on Pearl Mini using the Admin panel. New channels automatically use the same aspect ratio as the default frame size setting for the channel, which is 16:9. You can change the encoding settings for

a channel after the channel is created.

The default encoding settings for a channel are:

- **Video**: H.264, 1920x1080@30 fps, auto bit rate

- **Audio**: AAC, 48kHz stereo, 320 kbps

> If the channel's video source doesn't have a 16:9 aspect ratio, the system automatically detects the correct aspect ratio and updates the layout after you leave and return to the custom layout editor page. This happens because the channel's encoding page has **Use current signal resolution as frame size** selected by default. If you want to change the aspect ratio for your channel, see **Configure channel encoding**.

For optimal performance, Pearl Mini comes pre-configured with two full HD channels at 30 fps: HDMI-A and HDMI-B. You may find it easier to reconfigure those existing channels instead of deleting and creating new ones. For important considerations before deleting channels when configuration presets are used, see Configuration preset considerations.

It's possible to create a third channel and adjust the encoding settings of your channels to economize the CPU processing, but we don't guarantee optimum performance from your Pearl Mini with three channels. To optimize the performance of your Pearl Mini if you have more than two channels configured, consider deleting unused layouts and avoiding up scaling or down scaling video sources.

Each additional channel and layout consumes additional CPU processing capacity of Pearl Mini, see Optimum CPU performance.

When you create a channel, it's convenient to add your video and audio sources at that time. Channels can have one or more video and audio sources. This procedure includes basic steps to add a single video and audio source.

To create a channel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the **Channels** menu, click **Add channel**. The custom layout editor for the new channel opens and the default layout is selected.
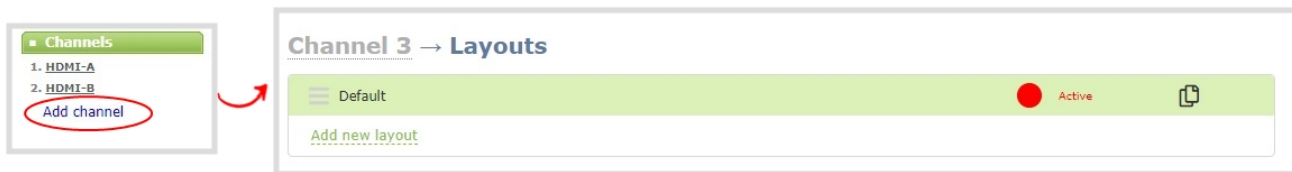
A 16:9 workspace appears in the layout area.

Channel 3 → Layouts

≡ Default   ● Active   ⧉

Add new layout

Default   ☑ Snap to grid

Add new item

Background [_____▼]

3. Click **Add new item** and select **Video Source**.
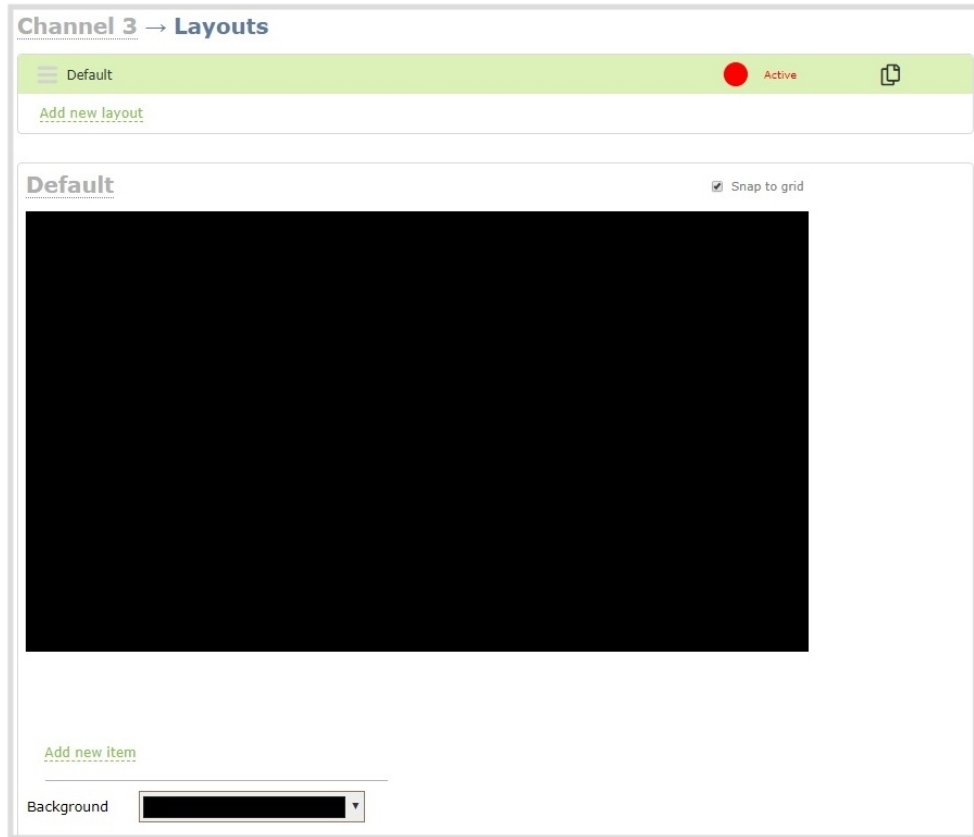
Add new item
[_____▼]

Add new item
  Video Source
  Picture
  Text
Audio

4. From the Source settings, select a video source in the **Source** drop down.
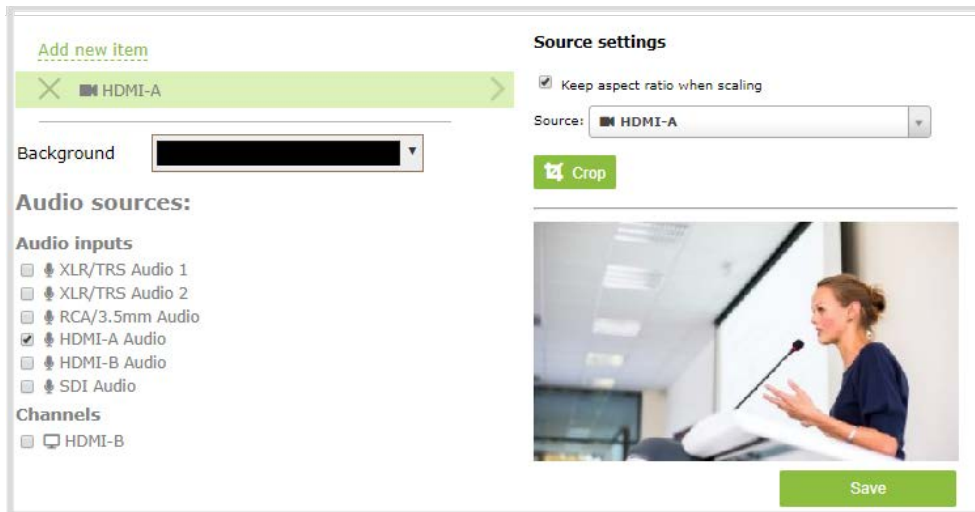
> For best results, **Keep aspect ratio when scaling** should be checked under **Source settings**.

The selected video source appears in the layout area.
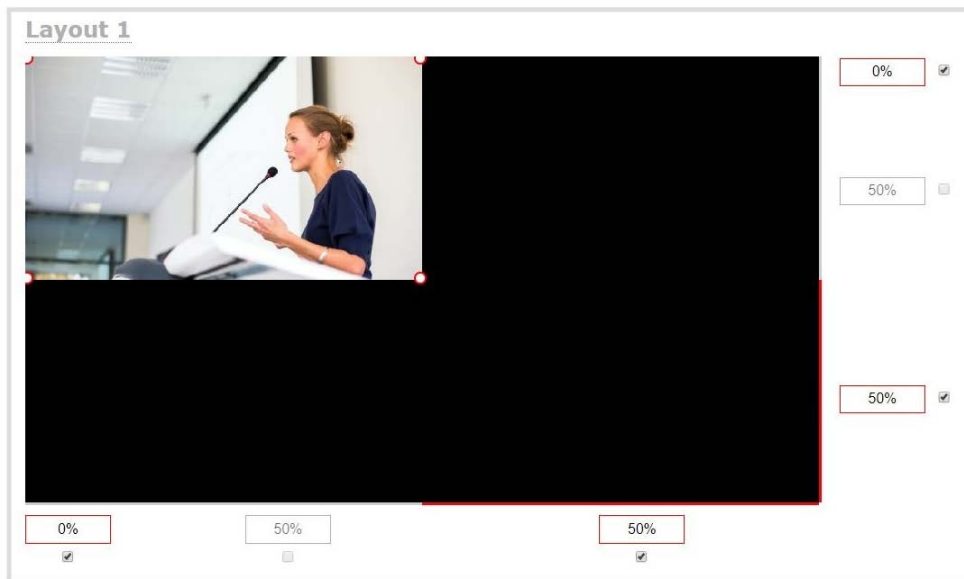
5. Click and drag the red and white handles on the corners of the source to re-size it in the layout editor area. For a single source channel, it should fill the entire layout area. Alternatively, you could enter a value in the percentage boxes that are along the side and bottom of the layout editor area to resize the video source.

6. Select an audio source from the list of audio sources.

> If a channel is selected as a video source, the corresponding audio for that channel is selected by default.

7. Click **Save**. Your channel is ready for basic streaming and recording.

> Because this is a single-source channel with only one layout, the channel's name is updated to display the source's name next time you view the channel. Click the channel name to refresh. Rename the channel and choose a custom name if you don't want the channel name to change, see **Rename a channel**.

What's next?

The default channel encoding setting should work fine in most cases. To check the encoding settings for the channel, see Configure channel encoding. There are a lot of creative things you can do next with your channel, including creating more layouts, adding multiple video and audio sources, and customizing layouts to add images and backgrounds, see Custom layout configuration.

Add video sources or a channel as a source

You can add one or multiple video sources to any of the layouts for your channel using the custom layout editor. You can even add the output from another channel as a video input source.

When you add a channel as a video source in another channel, whatever is displaying live in that channel also displays in the other channel. This is useful when you need to stream the same switched program to multiple destinations that have different encoding settings. That's because the encoding settings are set at the channel level.

For example, to stream your switched program to YouTube at 1920×1080 and to Facebook at 1280×720, you could:

1. Set up HDMI-A as **Channel 1** and use this as your switched program channel. Add all your custom layouts to Channel 1 and stream this channel to YouTube at 1920×1080.

2. Set up HDMI-B as **Channel 2** and use this as your Facebook streaming channel. Configure Channel 2 with a single layout that uses Channel 1 as the video source, and then stream Channel 2 to Facebook at 1280×720.

For instructions to set up multi-encoded channels using the channel as a source feature, see Multi-encoding and channel as a source.

> **STOP**
>
> If more than one video source is added to a channel, we recommend configuring the channel encoding to use a fixed resolution as the frame size instead of automatically using the resolution of the video source as the frame size (default). A fixed channel resolution ensures that your channel displays properly at a fixed resolution. Using a fixed channel resolution also avoids unintended resolution changes when switching between multiple layouts if the different layouts happen to have different video sources with different resolutions, see **Configure channel encoding**.

To add a video source or a channel as a source:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channel menu, select a channel and click **Layouts**. The custom layout editor opens.

3. In the Layouts list that appears at the top of the page, click a layout's row to select that layout or click **Add new layout**.

4. Below the Layout area, click **Add new item** and select **Video Source**. The Source settings appear.

5. From the Source settings, select either a video input or a channel in the **Source** drop down.
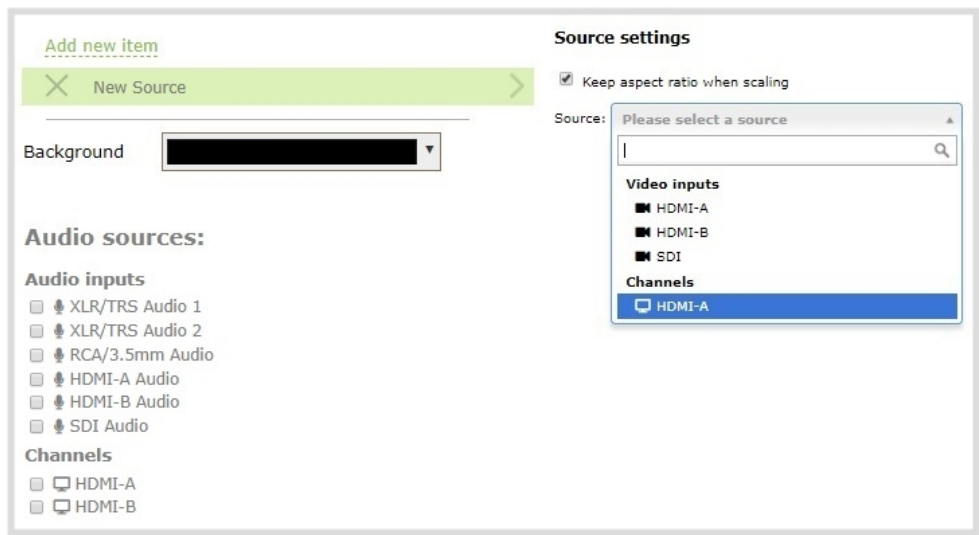
> For best results, check **Keep aspect ratio when scaling** in the **Source settings**.

The selected video source appears in the layout area.
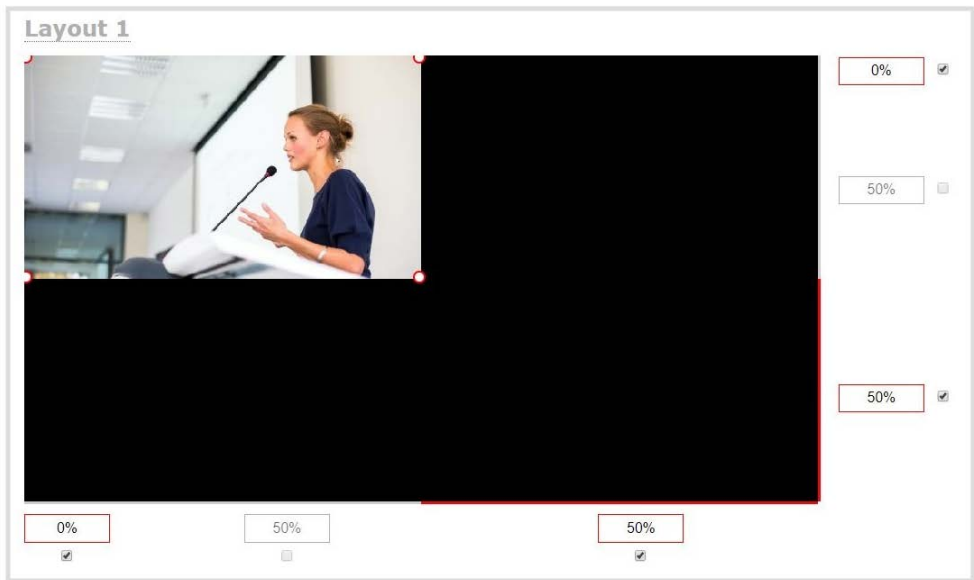
6. Click and drag the red and white handles on the corners of the source to re-size it in the layout editor area. Alternatively, enter a value in the fields along the side and bottom of the layout editor area to resize the selected item. For a channel with only a single video source, it should fill the entire layout area. For a layout that includes multiple video sources, you can move, resize, or crop each video source to exactly how you want them to appear.
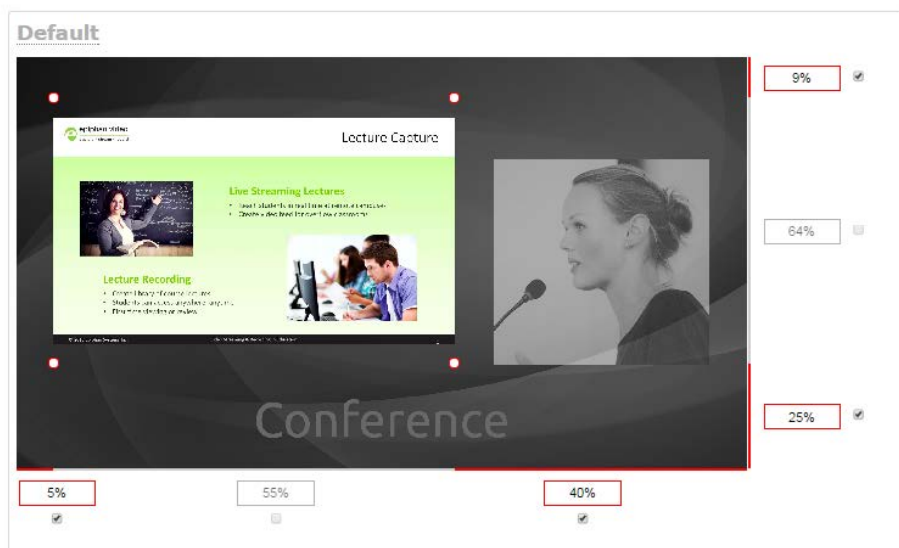
> To layer video sources over top of each other, like for picture in picture, you can click and drag the video sources that appear in the item list beneath **Add new item** and change their order. Items that are higher up the list appear over top items that are lower down the list.

7. Select an audio source from the list of audio sources.

> If a channel is selected as the video source, the corresponding audio for that channel is selected automatically by default.

8. Click **Save**.

A note about item positioning and sizing

There are four ways to position and size items in the layout area

1. using the mouse

2. using the keyboard

3. using the manual positioning values with percents

4. using the manual positioning values with pixels

To use the mouse:

Click and drag to move the item. Click and drag the round, red and white handles to resize an image or video source (for text overlays, just use the padding settings). Using this method you can make quick changes that are in increments of approximately 5% of the width or height of your layout area. For more refined movements, press the Ctrl key on your keyboard while dragging the item with the mouse.

To use the keyboard:

Use the arrow keys on the keyboard to move the item up, down, left or right in the layout. Changes are in increments of approximately 5% of the height or width of the layout area. Press the Ctrl key while using the arrow keys to make more refined movements. To change the size of an image or video source, press the Shift key while using the arrow keys (for text overlays, just use the padding settings). Press both Ctrl and Shift for fine-grained size control.

Using percents:

Specify a whole number, followed by a percent sign (e.g. 4%) in any of the manual positioning fields. See Resize and position items using percents or pixels for more information.

> **Using pixels:**
>
> If you need to specify an exact amount in pixels (rather than percent) you can type a pixel value in any of the positioning value squares followed by the characters px (e.g. 56px). You can mix and match pixels and percents changing only the boxes you want to use pixel values. At any time you can switch back to percents by typing a percent. See Resize and position items using percents or pixels for more information.

Add an audio source to a layout

You can add multiple audio sources to the layouts for a channel using the Admin panel. Each layout can have the same audio sources in them or you can choose different audio sources. By default, audio is enabled for the channel on the channel's encoding page.

A audio source has the same gain no matter how may layouts the audio source is added to, or if you've added just the one audio source or several audio sources to the same layout.

Important considerations

- The audio that's coming from the connected HDMI video sources (HDMI-A or HDMI-B) is automatically selected as the audio source for the HDMI-A and HDMI-B channels on Pearl Mini by default.

- If a channel is selected as the video source for a layout, the corresponding audio for that channel is added automatically.

- You can add multiple audio sources to the same layout. However, if the two audio sources share all or some of the same audio signals, such as when two in-phase microphones are placed in close proximity to each other, then the common audio signals are added together and their volume is amplified.

- Selecting multiple loud audio sources in the same layout may cause audio clipping on that layout. Before going live, always check volume levels for the layouts that have a large number of audio sources and adjust the volumes at source to avoid clipping, see Adjust audio gain and delay.

- If audio encoding is not configured for a channel, no audio signal is processed or sent with the video content when recording, streaming, or confidence monitoring, see Configure audio encoding.

- If an audio source is added to a layout and then the audio device is disconnected from the input port on Pearl Mini, some residual noise may be detected in the layout. Remove the audio source from the layout.

- Pearl Mini supports many different audio devices, including dynamic and condenser microphones, passive and active electret microphones, professional line-level audio mixers, and consumer line level sources like mobile phones and audio players. For details about the different audio ports and if audio gain is recommended when connecting different types of audio devices, see AV inputs and Selecting an audio source.

To add an audio source to a layout:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channel menu, select a channel and click **Layouts**. The custom layout editor opens.

3. In the Layouts list that appears at the top of the page, click a layout's row to select that layout.

4. Check the audio source that you want to use for the layout and click **Save**.
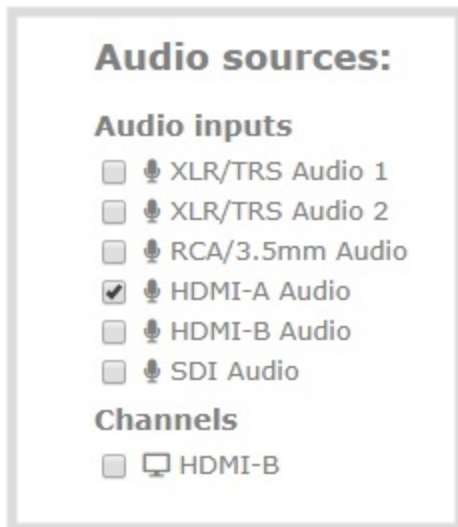
What's Next

You can check the audio encoding settings for your channel and ensure that audio is enabled, see Configure channel encoding.

To adjust the gain for an audio input source, see Adjust audio gain and delay.

Duplicate a channel

You can duplicate any channel you've created. All settings in the channel you duplicate are recreated.

To duplicate a channel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Admin panel, scroll to the Channels menu option.

3. From the Channels menu, click **Status**. The Status page opens.
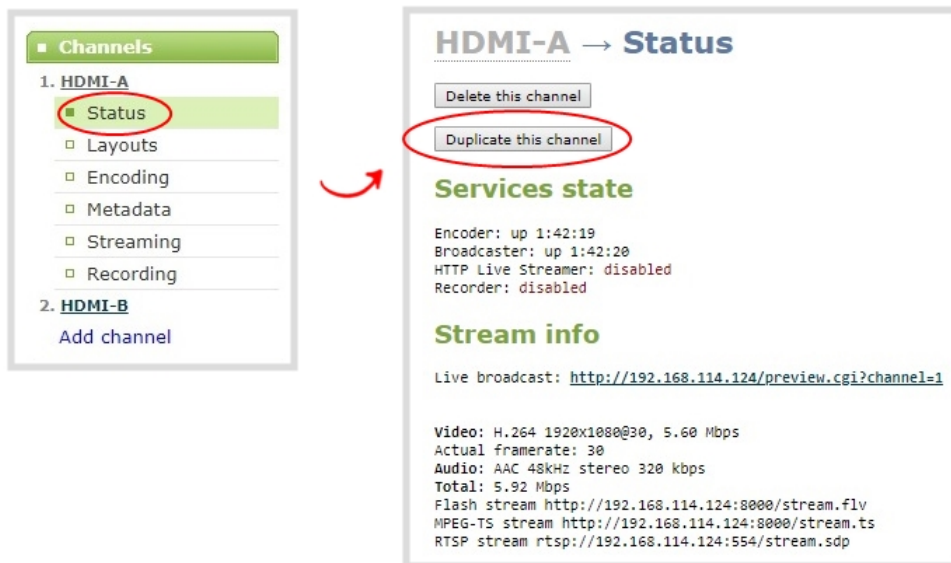
4. Click **Duplicate this channel**. The duplicate channel is created and assigned the next sequential number in the Channel menu.

5. Click **Save**.

Rename a channel

Channels are created with the same name as their video source by default. When a second layout or a second video source is added to the channel, the channel name changes to **Channel X**, where **X** is the index number for the channel. To stop a channel name from automatically changing, you should assign the channel a custom name using the Admin panel.

You can change a channel's name from any of the channel configuration pages or using the custom layout editor.

To rename a channel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click any of menu options for the channel. For example, click **Metadata**.

3. Click on the channel name that appears at the top of the page. The text turns red.
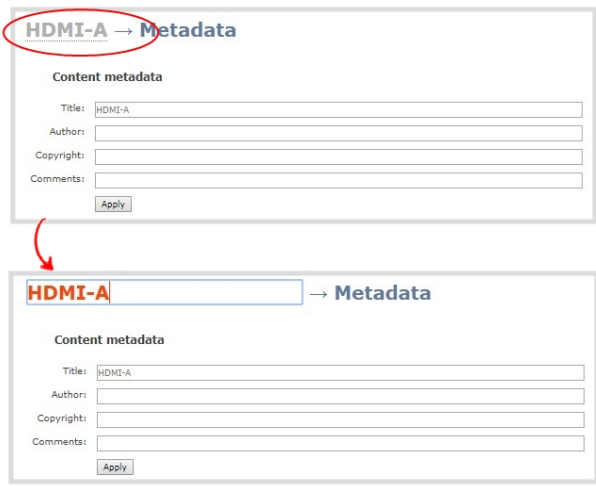
4. Enter the new name using alphanumeric characters. We recommend using underscores to separate words rather than using spaces.

5. Press **Enter** using your keyboard to save the new name.

Delete a channel

You can delete a channel using the Admin panel. Deleting a channel removes all recorded files that are associated with that channel. You cannot recover recordings for a channel after the channel is deleted. We recommend that you stop recording or streaming for the channel before deleting the channel.

> 🛑 If you have multiple configuration presets, deleting a channel removes all recorded files that are related to that channel across all presets. For important information about how channels are indexed in Pearl Mini and how that affects deleting channels when configuration presets are used, see **Configuration preset considerations**.

To delete a channel, follow the steps below.

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channel menu, select a channel and click **Status**. The Status page for the channel opens.
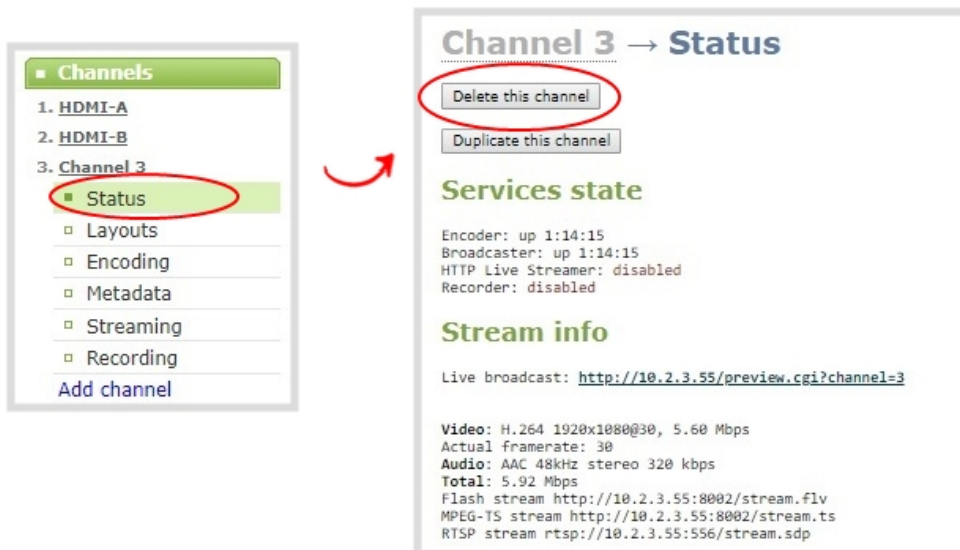
3. Click **Delete this channel** and click **OK** when prompted to delete the channel, or click **Cancel**.

Preview channel

You can open a live preview of a channel in your web browser to see any configuration changes you make to the channel as you make them. Web browsers that support HTML5 and Flash are supported.

There are several ways to preview channels:

* Preview a channel from the Info page
* Preview a channel from the Status page
* Preview all channels at the same time

> 📋 You can also preview channels using Epiphan Live, see **Configure Dashboard panels** for more information.

Important considerations

* Some web browsers disable auto playback of videos with audio. In those cases, the audio for the channel being previewed is muted by default.
* HTML5 does not support PCM audio encoding. If PCM audio encoding is configured for a channel, audio does not play in the preview link for the channel.
* PCM audio encoding at 48 kHz is not supported. A live broadcast preview link is not provided for a channel that is configured for PCM audio encoding with a sampling bitrate of 48 kHz.

Preview a channel from the Info page

The Info page has preview links for all the channels that are configured on Pearl Mini.

To preview a channel from the **Info** page:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Info**. The information window opens .

3. Click **View** for the channel that you want to preview. A preview window opens.

Preview a channel from the Status page

You can use the Admin panel to open a preview link for a channel from the Status page. The Live broadcast preview can be viewed using web browsers that support HTML5 or Flash. You can also see a preview of the channel directly from the Status page itself.

The Status page lists information about the channel, including stream information such as the bit rate, frame size, streaming and preview links, as well the state of the services on Pearl Mini.

To preview a channel from the Status page:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Status**. The Status page opens and a live preview snapshot appears below the Stream info.
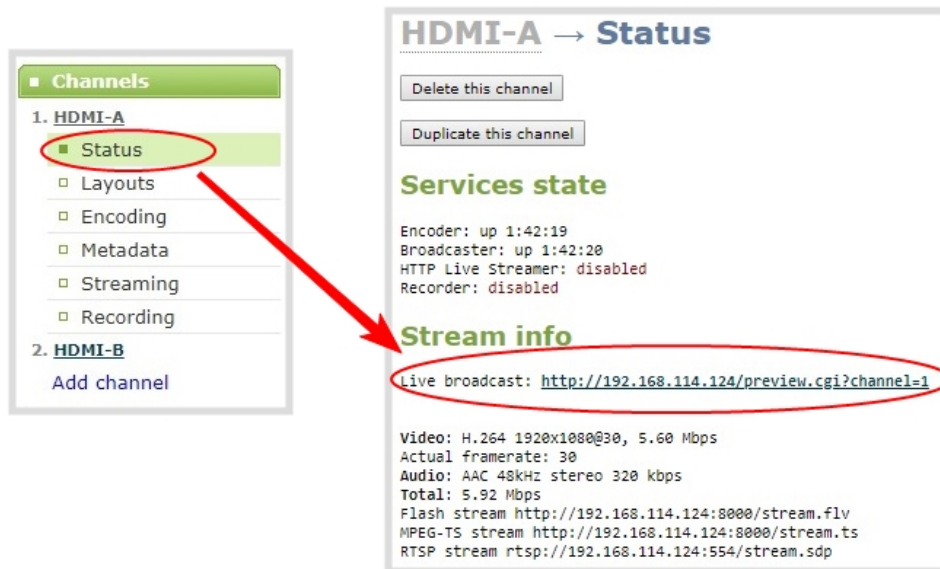
3. Right-click the **Live Broadcast** link and select **Open in a new Tab** or **Open in a new Window**.

Preview all channels at the same time

Pearl Mini has a special preview mode that lets you see all configured channels at once.

> The resulting web page can be very large. You can use your keyboard's zoom keys or the zoom buttons for your web browser to adjust the screen view. Plus many browsers support short cuts, like Ctrl- (control minus) to zoom out and Ctrl+ (control plus) to zoom in.

To preview all channels at the same time:

1. Open a new tab in your web browser on the Admin computer.

2. Go to the following URL to open the preview web page for your Pearl Mini, where *<ip address>* is the IP address of Pearl Mini. To find the IP address of your system, see View system information using the Admin panel or View system information using the touch screen

> http://*<ip address>*/preview.cgi?channels
>
> **For example:** http://172.1.1.10/preview.cgi?channels

To preview a single channel, you can enter the following URL: **http://<ip address>/preview.cgi?channel=X**

where*<ip address>* is the IP address of Pearl Mini and *X* is the channel's index number.

Add or remove channel metadata

When you configure metadata for a channel, that metadata is embedded in all channel recordings and streams. You can specify the following metadata that the media player displays for your viewers:

- title of the presentation
- company website
- presenter's name
- copyright date or other labels such as proprietary information, preliminary etc.
- additional information about the broadcast, such as time of the broadcast, or change to the schedule

How metadata is displayed depends largely on the media player. For example VLC, stores the metadata in a media information file, while other media players scroll the text horizontally from right to left across the bottom of the media player window.

To add or remove channel meta data:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Metadata**. The Metadata configuration page opens.
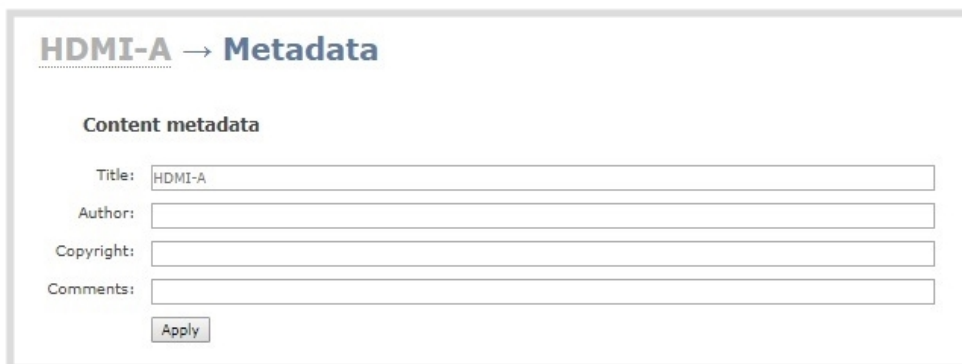
3. Do one of the following:

   a. To add metadata, simply enter the information in to the fields, such as: title, author (or authors), copyright information, and descriptive comments.

   b. To remove metadata, simply delete the information that appears in the fields.

4. Click **Apply**.

Configure channel encoding

You can modify the encoding settings for each channel. The encoding settings let you fine tune your channel recording or live stream. You can select a specific frame size, bit rate, audio or video codec, and more.

Topics include:

- Codecs and file format compatibility
- Configure video encoding
- Configure audio encoding
- Multi-encoding and channel as a source

Codecs and file format compatibility

Pearl Mini supports the following video and audio codecs.

Table 32 *Supported video codes*

Value	Description
H.264	H.264 is the default video codec configured for the channels on Pearl Mini. This codec provides high quality video while using low bandwidth and is the preferred codec to use with the system.
Motion JPEG	Motion JPEG is suitable for live streaming and video; however, you can experience low quality images while using high bandwidth. Motion JPEG does not support audio.

Table 33 *Supported audio codecs and bitrate guidance*

Value	Description
AAC	AAC is comparable to MP3 and may even provide better sound quality at a similar sample bitrate. Supported sampling bitrate values are: 16, 22, 44 and 48K kHz. Setting the channel bitrate to match the audio source's bitrate provides the best sound quality and avoids audio resampling. Most digital signals (HDMI or SDI sources) use 48 kHz. Most digital signals (HDMI or SDI sources) use 48 kHz audio. For analog signals, 44 kHz provides a good quality audio sample. The maximum bitrate for mono encoding of a 44 kHz signal is 264 kbps. For stereo, 320 kbps is supported. Note that lower bitrates (e.g. 32 kbps) with a 44 kHz signal may result in distorted audio.
MP3	MP3 provides a common audio format for audio storage. Supported sampling

Value	Description
	bitrate values are: 22 kHz, 44 kHz and 48 kHz.
	Setting the channel bitrate to match the audio source's bitrate provides the best sound quality and avoids audio resampling. Most digital signals (HDMI or SDI sources) use 48 kHz. For analog signals, 44 kHz provides a good quality audio sample.
	☑ Web browsers that use Flash (FLV) do not support 48 kHz MP3 audio. When selecting this encoding, you must use a web browser that supports HTML5 or a media player to preview your channel.
PCM	Pulse Code Modulation (PCM) is a standard for digital audio in computer and other devices such as, digital telephone systems.
	Setting the level to match the audio source's level provides the best sound quality and avoids audio resampling. Most digital signals (HDMI or SDI sources) use 48 kHz audio. For analog signals, 44 kHz provides a good quality audio sample.
	☑ When previewing a channel using the Live broadcast link or the preview link in the Admin panel, some web browsers do not play audio if PCM is the configured audio encoding for the channel. Choose a different audio codec for the channel or use a media player to preview the channel. Web browsers that use Flash (FLV) do not support 48 kHz MP3 audio.

Format compatibility

Not all streaming and recording protocols support all combinations of video and audio codecs. The following table displays the compatibility between the video/audio codecs and the supported streaming formats.

Table 34 *Video/audio codecs and formats for streaming*

Video Codec selected	Audio Codec selected	RTSP	FLV	MPEG-TS	MJPEG
H.264	No audio codec	✓	✓	✓	

Video Codec selected	Audio Codec selected	RTSP	FLV	MPEG-TS	MJPEG
H.264	PCM	✓	✓		
H.264	MP3	✓	✓	✓	
H.264	AAC	✓	✓	✓	
MJPEG	No audio codec				✓

The following table displays the compatibility between the video/audio codecs and the supported recording formats.

Table 35 *Video/audio codecs for formats for recording*

Video Codec selected	Audio Codec selected	MP4 and MP4-Frag-mented	AVI	MOV	MPEG-TS
H.264	No audio codec	✓	✓	✓	✓
H.264	PCM	✓	✓	✓	
H.264	MP3	✓	✓	✓	✓
H.264	AAC	✓	✓	✓	✓
MJPEG	No audio codec	✓	✓	✓	✓

Configure video encoding

You can configure the video encoding settings for each channel using the Admin panel. Video encoding settings include:

- **Video codec**: The video codec determines the type of compression and decompression, and also affects the video quality. Options are H.264 (default) and Motion JPEG.

- **Hardware or software encoding**: Hardware encoding is the default setting and is the recommended encoding for use with Pearl Mini.

- **Encoding level**: This can be set to High, Main, or Baseline.

- **Frame size:** The resolution applied to the channel when you stream, record, or output video to a confidence monitor. This can be set to automatically match the input video's resolution or set to a fixed resolution.

- **Key frame interval**: How often a key frame that contains all the pixels is sent when streaming. The longer the key frame interval, the smaller the video file size (and vice versa).

- **Bitrate**: If using the H.264 video codec, you can increase or decrease image quality by increasing or decreasing the channel's **Bitrate** value. Video with a high level of motion and high resolution, such as sporting events, requires a higher bitrate.

> 🛑 By default, Pearl Mini automatically uses the incoming video source frame size as the frame size for streaming and recording when the channel has only one layout with a single video source. If you're channel has multiple video sources or layouts, you must manually set a frame size for the channel.
>
> If you plan to switch layouts during a live stream, a fixed frame rate is recommended. This avoids the stream from stopping and restarting due to frame size changes when switching between single-source layouts that use different frame sizes.

The larger the channel's frame size, the more bandwidth is needed for streaming and the recorded files are bigger. You can choose to use the same frame size as the original video source, or you could configure a smaller frame size for the channel and let Pearl Mini downscale the video.

For example, if the input video signal resolution is 1920×1080 (a 16:9 aspect ratio) and the channel's frame size is set to 1280×720, Pearl Mini downscales the video and streams (and records) the channel at the lower frame size, using less bandwidth and producing smaller recorded files.

You can also add black bars around your video source by adjusting the frame size. For example, if your video source has a 16:9 widescreen/HD format but you need a 4:3 frame size on your output, Pearl Mini automatically adds black bars to the top and bottom of the frame if you choose a frame size for the channel that has a 4:3 aspect ratio.

If your channel has a layout with only one source and your source and stream aspect ratios differ, when viewing that layout, your source is centered in the frame and matte bars are added automatically to the top and bottom (or left and right sides) of the frame to make up the difference. See Remove black bars (matte) from the video.

Important considerations

- For optimum system performance, the frame size of the channel should be set to match the frame size of your video input source to avoid scaling, see Optimum CPU performance.

- If you have unchecked all the manual resizing and positioning boxes in the custom layout editor and you downscale the video source using the frame size setting on the **Encoding** tab (for example, select 1280×720 frame size for a full HD video source), then the source appears cropped within the frame instead of scaling to fit the frame.

There is some trade off between video quality and bandwidth size, depending on the encoding settings you choose. The following table lists some additional considerations when choosing video encoding settings.

Table 36 *Video encoding settings*

Setting	Description
H.264	H.264 is the default codec and provides high quality video while using low bandwidth. This is the preferred codec for the system.
Motion JPEG	This codec is suitable for streaming and recording video, however you get lower quality images and it requires a large amount of bandwidth. Motion JPEG does not support audio.
Key frame interval	The key frame interval feature specifies how often a key frame (a frame that contains all the pixels) is sent when streaming the video. This setting also impacts how quickly a video moves through the frames when a viewer uses the search function of their media player. Increasing the number of seconds between key frames can significantly reduce your bandwidth and system resource usage with minor impact to your video quality. A good rule of thumb is to keep the interval between 2 to 3 seconds and decrease the key frame interval as the motion increases. Try different settings and note changes in the video quality. If your video quality is poor and jittery you may need to decrease the interval between key frames. If you have unlimited bandwidth and system resources you can choose an option to stream key frames only.
Frame rate	Frame rate reflects the number of images that are encoded per second. Reducing the frame rate for a channel reduces bandwidth usage, and vice versa. The system's ability to maintain a set frame rate is based on several factors, for example: • overall system load affects the ability for the device to process pixels; • available network bandwidth; • the source and stream frame size (resolution); • the type of motion that is captured; and • number of users accessing the stream. When adjusting the frame rate, you may need to try different values to achieve the best outcome.

Setting	Description
Bitrate	In general, higher bitrates mean higher image quality, but more bandwidth is needed for streaming and video recordings are larger. If you're using H.264, then you can set the bitrate to improve the image quality.
	For example, an HD Blu-ray video is typically in the range of 20 Mbps, whereas a standard-definition DVD is usually 6 Mbps.
	If you're unsure what bitrate value to use, start at 5000 kbps (slightly less than a typical DVD) and test to see how this looks for your viewers.

To configure video encoding for a channel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

1. From the Channel menu, select a channel and click **Encoding**. The encoding configuration page opens.
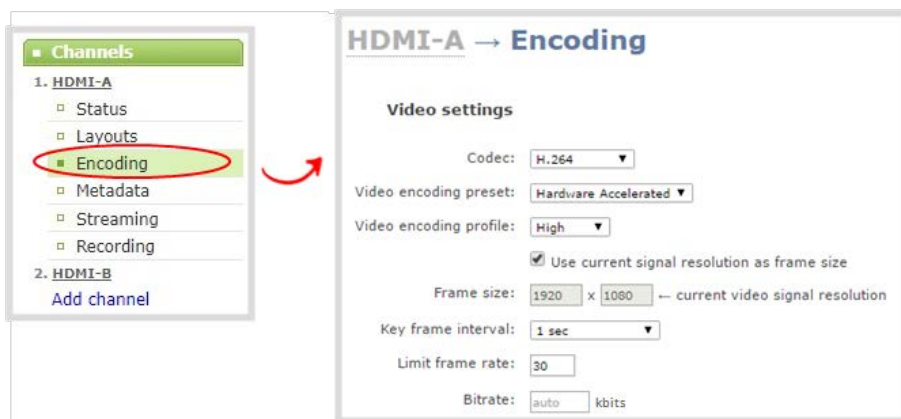
2. Select a video **Codec** and do one of the following:

    a. If **JPEG** is selected, click **Page refresh time** and enter a time in seconds.

    b. If **H.264** is selected, select a **Video encoding preset** and a **Video encoding profile**.

Item	Options
Video encoding preset	**Hardware Accelerated**: This is the default H.264 encoding preset. Choose this setting for best performance.
	Software: This matches the default from previous generations of Epiphan products. **Only** select this if you need software encoding or X.264 encoding to match results created with previous generations of Epiphan products or firmware
Video encoding	**Baseline**: Choose this option when streaming to an application that

Item	Options
profile	requires robustness and cannot tolerate data loss, for example video-conferencing. **Main**: Choose this option for standard-definition broadcasts. **High**: This is the default. Choose this option when video is viewed for broadcast and disk storage applications, particularly for high definition television application such as Blu-ray disk storage format and HDTV broadcast service.

3. Configure the frame size, do the following:

   a. Uncheck **Use current signal resolution as the frame size**.

> Enabling **Use current signal resolution as the frame size** is not recommended if the video input resolution changes frequently. An unstable cable or other disturbance that causes the resolution of the video input signal to change during a live stream can cause the stream to drop. Unchecking this feature helps prevent that.

   b. Select a **Frame size** from the list of options or enter a custom frame size in pixels.
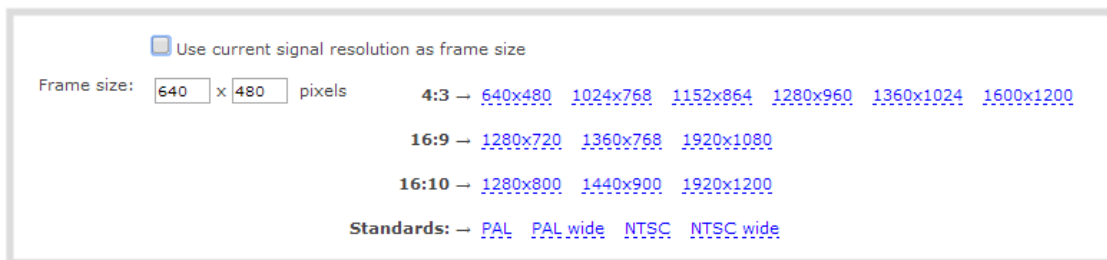
4. Change the **Limit frame rate**. The default should be adequate in most applications. While decreasing the limit may improve system performance, you may need to test different values to balance video smoothness and processing power

5. Change the **Bitrate**. If using H.264 video codec, you can increase or decrease image quality by increasing or decreasing the target **Bitrate** value. Video with a high level of motion and high resolution, such as a sporting event, requires a high bitrate.

6. Click **Apply**.

Configure audio encoding

If your channel includes audio sources in any of the layouts, then **AAC 48 kHz** is set as the default audio codec for the channel. You can choose a different audio codec for a channel using the Admin panel. The following table lists the supported audio codecs and bitrates.

Table 37 *Supported Audio codecs and bitrates*

Value	Description
AAC	The AAC (default) audio codec is comparable to MP3 and may produce better sound quality with a similar bit rate. Supported values are 16, 22, 44 and 48K kHz. Most digital signals (HDMI or SDI sources) use 48 kHz audio. Matching the encoded level with the source level provides the best sound quality by avoiding audio resampling. For analog signals, 44 kHz provides higher sampling. The maximum bitrate for mono encoding of a 44 kHz signal is 264 kbps. For stereo, 320 kbps is supported. Note that lower bitrates (e.g. 32 kbps) with a 44 kHz signal may result in distorted audio.
MP3	MP3 provides a common audio format for audio storage. Supported values are 22 kHz, 44 kHz and 48 kHz. Most digital signals (HDMI or SDI sources) use 48 kHz audio. Matching the encoded level with the source level provides the best sound quality by avoiding audio resampling. For analog signals, 44 kHz provides higher sampling. Flash (FLV) doesn't support 48 kHz MP3 audio. When selecting this value you'll need to use a media player to preview your channel.
PCM	Pulse Code Modulation (PCM) is a standard for digital audio in computer and other devices such as, digital telephone systems. Most digital signals (HDMI or SDI sources) use 48 kHz audio. Matching the encoded level with the source level provides the best sound quality by avoiding audio resampling.

Value	Description
	✅ Flash (FLV) doesn't support 48 kHz PCM audio. When selecting this value you'll need to use a media player to preview your channel.

To change the audio codec for a channel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channel menu, select a channel and click **Encoding**. The encoding configuration page opens.

Audio settings

☑ Enable audio

Audio format: AAC 44 kHz ▼

Audio channels: Stereo ▼

Audio bitrate: 320 kbps ▼

Apply
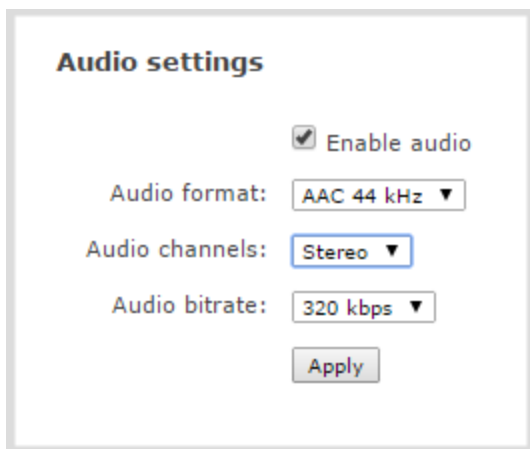
3. In the Audio settings, ensure that **Enable audio** is checked to include audio in the channel.

4. From the **Audio format** drop down, select an audio codec (AAC, MP3, or PCM).

5. From the **Audio channels** drop down, choose mono or stereo (default).

✅ Choose **Mono** to have left and right stereo channels combined and streamed together so that when you listen to the streamed audio, the same blended sound comes through both the left and right channels.

6. From the **Audio bitrate** drop down, choose a birtrate. For guidance, see audio bitrates. For stereo audio, we recommend 256 kbps or 320 kbps.

7. Click **Apply**.

Multi-encoding and channel as a source

Pearl Mini lets you easily do multi-encoding so you can record and stream the same content at different encoding settings. This is useful when you want to:

- Record a video at a high bitrate and frame size and live stream the same content at lower encoding settings.

- Record the channel while also sending two (or more) streams of that channel using different encoding settings for CDNs that don't use adaptive bitrates.

- Or record the same channel simultaneously at different resolutions, like full HD and HD.

For example, take a scenario where you want to record a video at 1080p and 8 Mbps, while simultaneously live stream the same video online 720p and 1 Mbps.
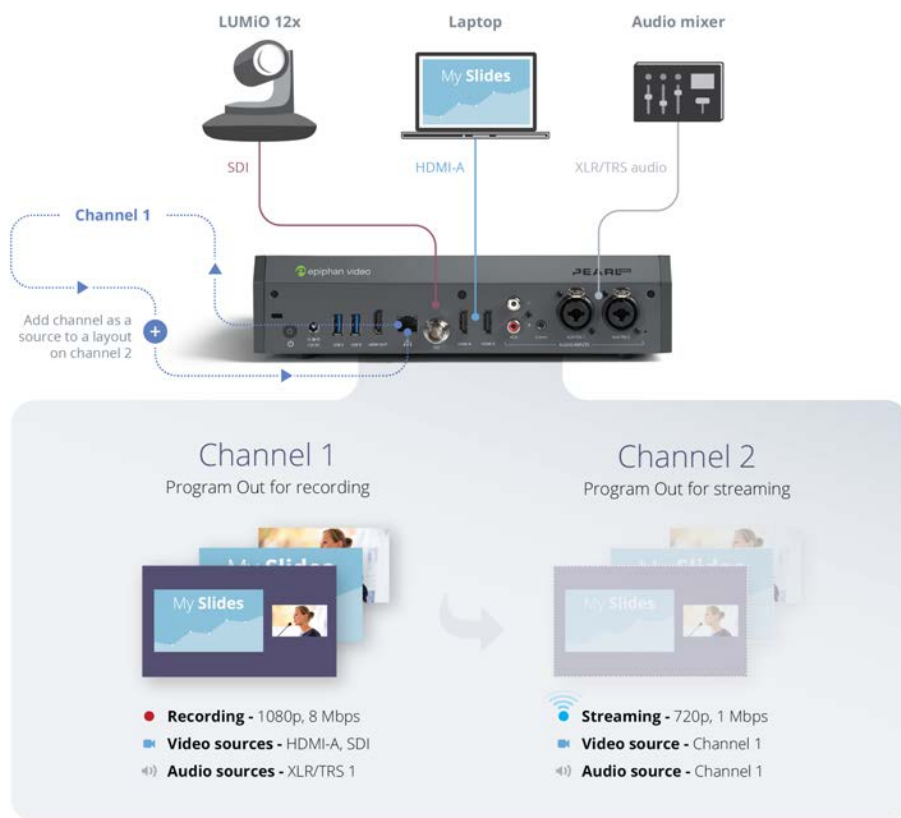
Follow these steps:
1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

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2. Create Channel 1 with your video and audio inputs. Add all your live switching layouts.

3. Set the **encoding** and **streaming** settings for channel 1.

4. Create Channel 2 for your recording with just one layout and add Channel 1 as the video source. Stretch it to fill the full screen.

5. For Channel 2's **audio source**, choose Channel 1 if not already selected by default.

6. Set **encoding** and **streaming** settings for channel 2.

Using this process, you can again use the same video you're recording on Channel 2, and stream it at a different bitrate and frame size.

For a different process that helps you accomplish similar goals, see how to set up a multi-publishing Stream

Custom layout configuration

Using the custom layout editor, you can create multiple layouts for your channel for completely different looks, like picture in picture or side-by-side video sources. You can add media like transparent images and custom backgrounds to a layout, and then resize and arrange all the different video and media elements the way you want. When you're ready to stream or record, you can switch between the different layouts for a more interesting and dynamic presentation.

Each layout you add to your channel adds overhead to Pearl Mini, and more complex layouts consume more of the system's resources. So, it's a good idea to delete any layouts you're not using.

Topics include:

- About the custom layout editor
- Add or edit a custom layout
- Upload or remove an image using the Media page
- Add an image to a layout
- Crop a video source
- Add a text overlay
- Custom system variables for text overlays
- Set the background color
- Resize and position items using percents or pixels
- Rename a layout
- Delete, move, or duplicate a layout

About the custom layout editor

Easily edit existing channel layouts or create new ones. The custom layout editor gives you full control of the size and position of images, video sources, and text overlays.

You access the custom layout editor using the Admin panel when you select your channel from the Channels menu and click **Layouts**. To add or delete a layout, see Add or edit a custom layout.

Layout selector

When you open the custom layout editor for a channel, a list of layouts appears at the top. You can create and delete layouts, duplicate layouts, choose which layout to preview and edit, and select the active live layout for live switching.
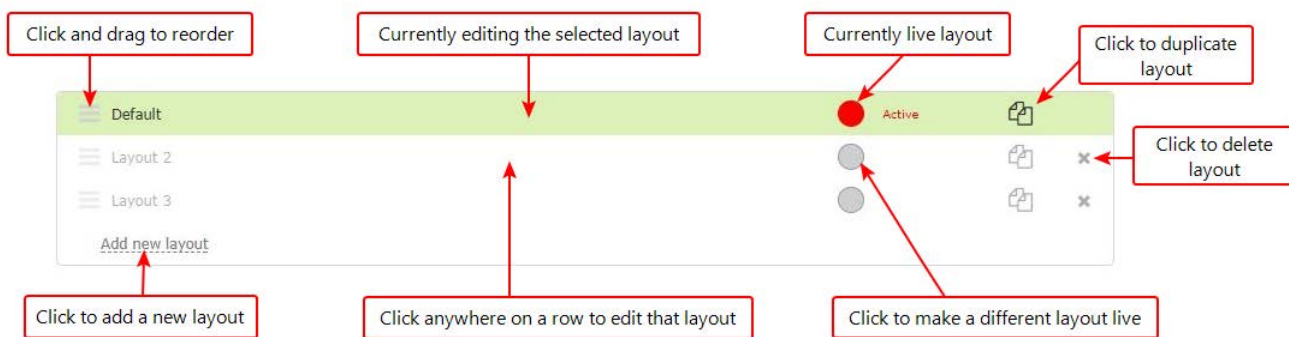
Layout editing

Below the layout list is the layout editing area where you can add images, add and edit video sources, and add text overlays to your layout. You can also choose the background matte as well as crop the images and video.
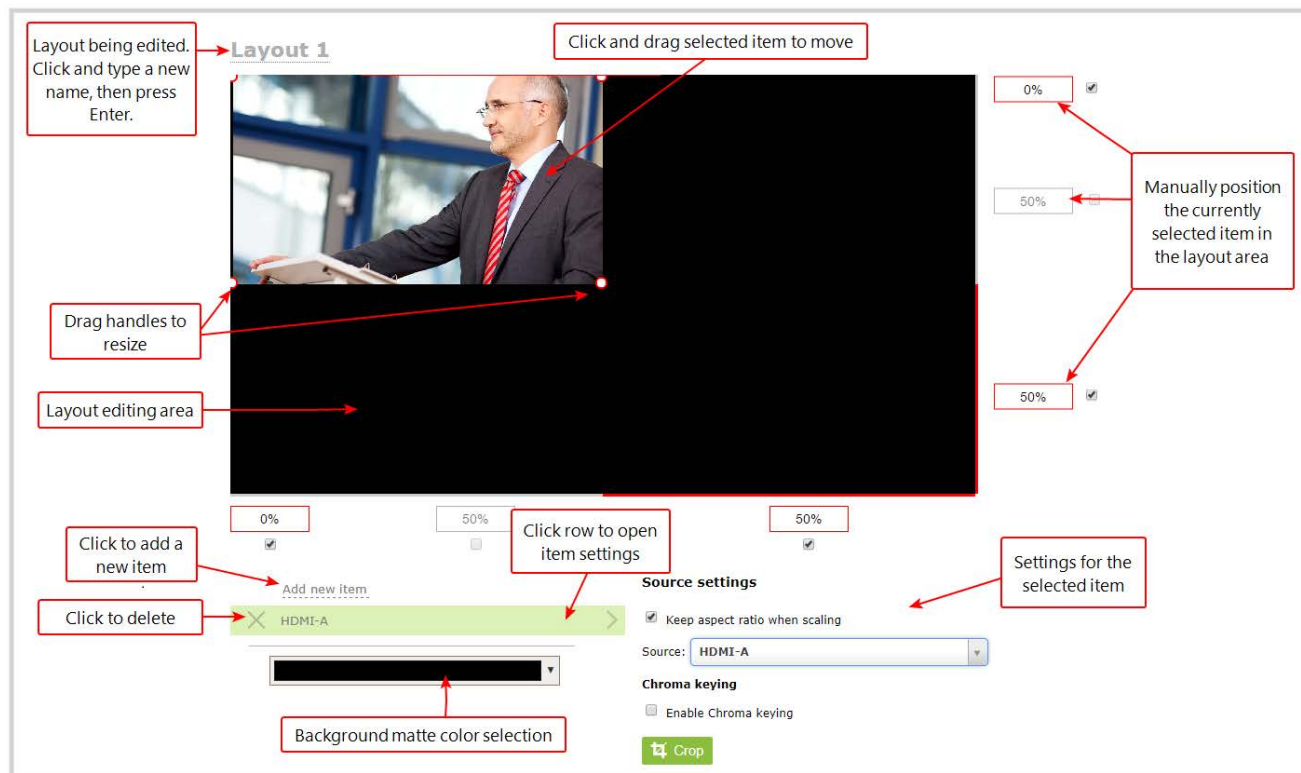
The main layout area has the same frame size and aspect ratio as the encoding setting of the channel. As you add items to the layout, they appear in the layout editing area. The currently selected item is presented in full color. Unselected items appear transparent.

To change the settings for an item, click an item in the item list that appears below the layout editing area. The settings for that item appears.

Move and size items in the layout editing area

To **position** the items in the layout editing area, you can use the mouse to click and drag an item in to position, or you can type values into the fields along the side and bottom of the layout area and manually position the selected item. You can enter values as a percentage of the full layout area (for example, enter **4%**) or in pixels (for example, enter **16px**).

You can **resize** items by clicking and dragging the red and white handles at the corners of an item or by entering values into the fields along the side and bottom of the layout area. To maintain the aspect ratio when resizing an item, make sure you've checked the **Keep aspect ratio when scaling** box for that item.

A note about item positioning and sizing

There are four ways to position and size items in the layout area

1. using the mouse

2. using the keyboard

3. using the manual positioning values with percents

4. using the manual positioning values with pixels

To use the mouse:

Click and drag to move the item. Click and drag the round, red and white handles to resize an image or video source (for text overlays, just use the padding settings). Using this method you can make quick changes that are in increments of approximately 5% of the width or height of your layout area. For more refined movements, press the Ctrl key on your keyboard while dragging the item with the mouse.

To use the keyboard:

Use the arrow keys on the keyboard to move the item up, down, left or right in the layout. Changes are in increments of approximately 5% of the height or width of the layout area. Press the Ctrl key while using the arrow keys to make more refined movements. To change the size of an image or video source, press the Shift key while using the arrow keys (for text overlays, just use the padding settings). Press both Ctrl and Shift for fine-grained size control.

Using percents:

Specify a whole number, followed by a percent sign (e.g. 4%) in any of the manual positioning fields. See Resize and position items using percents or pixels for more information.

Using pixels:

If you need to specify an exact amount in pixels (rather than percent) you can type a pixel value in any of the positioning value squares followed by the characters px (e.g. 56px). You can mix and match pixels and percents changing only the boxes you want to use pixel values. At any time you can switch back to percents by typing a percent. See Resize and position items using percents or pixels for more information.

Audio source selection and saving edits

Select audio source(s) for your channel by adding them to your layouts. The bottom section of the custom layout editor is where you select the audio source for the currently selected layout. It's also where you'll find the **Save** button.

If a layout doesn't have an audio source selected, there will be silence when that layout is selected during live switching, recording, and confidence monitoring.

Audio sources:

Audio inputs
- ☐ 🎤 XLR/TRS Audio 1
- ☐ 🎤 XLR/TRS Audio 2
- ☐ 🎤 RCA/3.5mm Audio
- ☑ 🎤 HDMI-A Audio
- ☐ 🎤 HDMI-B Audio
- ☐ 🎤 SDI Audio
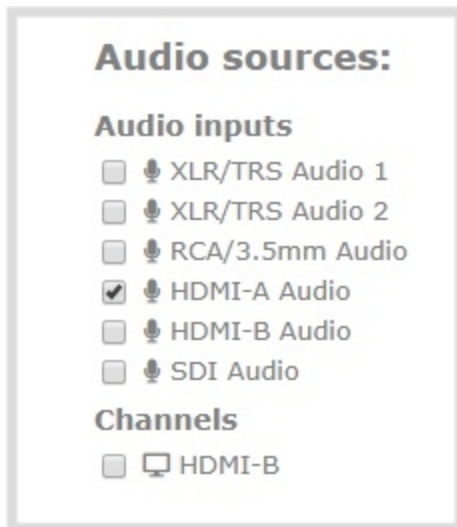
Channels
- ☐ 🖥 HDMI-B

HDMI-A and HDMI-B audio are already selected by default for the two default channels.

You can have multiple audio sources in a layout. The audio sources are mixed together at the same volume level as one another.

> If multiple audio sources in a layout have common audio signals, the common signals are added together, which amplifies the volume of the common signals in comparison to the rest of the audio that's coming from your sources. For example, if you connect two microphones that are set up in close proximity to each other and their signals are in phase, or if you connect stereo music left/right signals to the mono audio ports (mic or line) on Pearl Mini.

When setting the audio gain for your channel, add all your audio sources to your layout first, then set level of gain for your audio sources appropriately. When you're done all your changes, click **Save**.

Resize and position items using percents or pixels

You can position and resize layout items (images, overlay text, sources) using the percent/pixel adjustment boxes in a layout using the custom layout editor. See Resize layout items and Position layout items.

There are 3 adjustment boxes along your layout's horizontal axis and another 3 boxes along the vertical axis. You can enter **percent or pixel values** into checked adjustment boxes (bordered with red) to position and resize your item(s).

Percent values are used in adjustment boxes by default, and can be converted to pixels by simply overwriting the percent value in a given adjustment box and replacing it with a pixel value.

When entering **percent values**, ensure the suffix "%" is added to your value (i.e. "20%").

When entering **pixel values**, ensure the suffix "px" is added to your value (i.e. "200px"). A layout item's total pixel dimensions are a reflection of your channel's frame size, as configured in your encoding settings (see **Configure channel encoding**).

Unchecked boxes are grayed-out in color and are not directly editable but dynamically change their values to reflect a 100% total of either the horizontal or vertical axis, depending on values entered in adjacent adjustment boxes. See the Adjustment boxes for item resizing and positioning table below for more information.
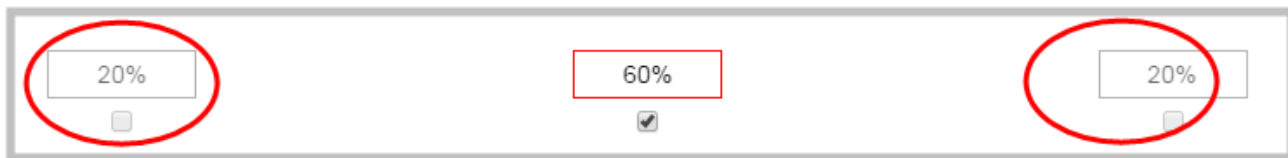
The values contained in checked boxes (bordered with red) are **anchored** and do not dynamically adjust their values.
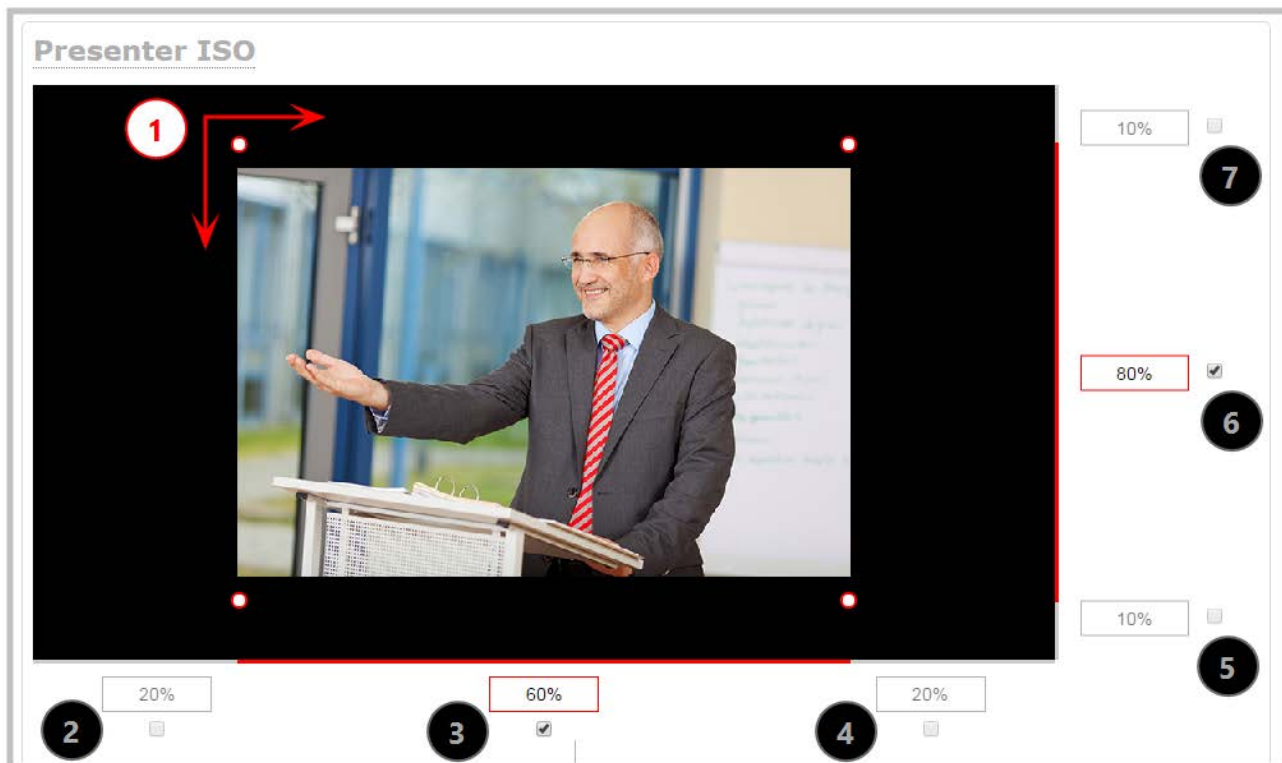
Table 38 *Adjustment boxes for item resizing and positioning*

Item	Description
1	The area of your layout item. The 4 red/white dots represent the boundaries of your layout item. There may be some black space between your item and its boundaries if **Keep aspect ratio when scaling** is enabled (see Add an image to a layout).
2	The percentage of blank space (or number of pixels) from **left to right** on the layout's horizontal axis. (I.e. the item is displaced 20%, or 200px, to the right).
3	If using percents, this value is the item's percentage of **total width on the layout's horizontal axis**. (I.e. the item takes up 60% of the layout's width – represented by a thin red bar above the percent box). If using pixels, this value is **the item's width, in pixels**, with a maximum pixel width (i.e. frame size) identified in your channel's encoding settings Configure channel encoding.
4	The percentage of blank space (or number of pixels) from **right to left** on the layout's horizontal axis. (I.e. the item is displaced 20%, or 200px, to the left).
5	The percentage of blank space (or number of pixels) from **the bottom upward** on the layout's

Item	Description
	horizontal axis. (I.e. the item is displaced 10%, or 100px, from the bottom up).
6	If using percents, this is the items percentage of **total height on the layout's vertical axis**. (I.e. the item takes up 80% of the layout's height – represented by a thin red bar to the left of the percent box). If using pixels, this value is **the item's height, in pixels**, with a maximum pixel width (i.e. frame size) identified in your channel's encoding settings Configure channel encoding.
7	The percentage of blank space (or number of pixels) from **the top downward** on the layout's vertical axis. (I.e. the item is displaced 10%, or 200px, from the top down).

Resize layout items

The easiest way to resize a layout item is to use the **center adjustment boxes** (annotated as #3 and #6 in the image above) on each of the horizontal and vertical axes to set your item's width and height respectively. You can also use your mouse cursor to select the corners and manipulate them into the size you want. Hold the shift key while doing so to keep the frame size constant. If you need to **crop** your image, see Crop a video source.
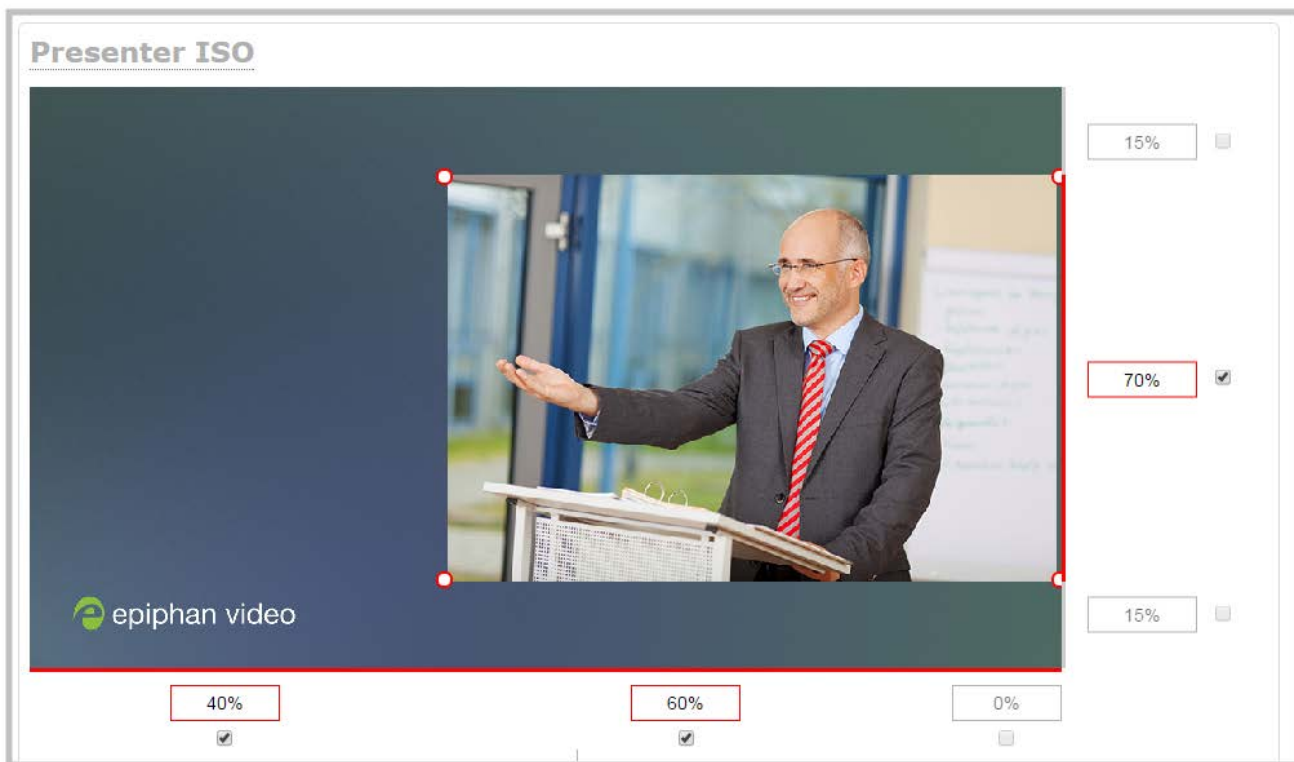
In the example above, the presenter video source is resized to 60% of the layout's width and 70% of the layout's height (with aspect ratio maintained). (Alternatively, pixels could be used to resize the layout item in a similar fashion.)

An important consideration when resizing layout items

Your item will resize automatically if both left and right (or top and bottom) adjustment boxes contain values (percents or pixels) that exceed the total of 100% (if using percents), or maximum pixel count (if using pixels) for the corresponding horizontal (or vertical) axis.

For example, if you originally set the width of an item to 50% of the layout area (or 960 pixels, assuming your item has a maximum width of 1920 pixels in this example) with no values entered in the left and right adjustment boxes (i.e. the left and right boxes are deselected), the item automatically centers itself in the layout area with the left and right percents at 25% each (remember – percents are used by default in the layout editor, even if pixels are used in adjacent boxes). Combined with the 50% (960px) width of the image, these two 25% (480px) values total 100% (1920px) of the layout's horizontal axis.

If you instead decide to enable the left and right percent boxes and change their values to 30% each (instead of the current 25%), then the image's width shrinks from 50% (960px) to 40% (750px) to accommodate the change and maintain a total layout width of 100% (1920px).
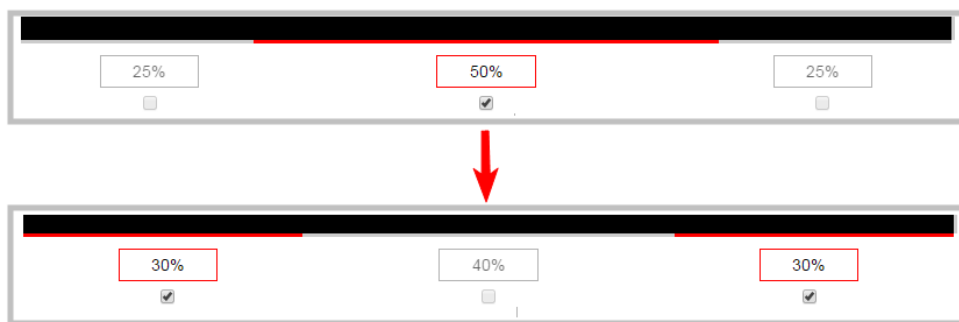
> Setting the left and right (or top and bottom) percent values so the axis total among the three percent boxes exceeds 100% will always result in the center percent box value automatically reducing itself to maintain the 100% total, shrinking your selected layout item in the process.

Position layout items

Items are positioned in a custom layout by entering values into the left/right and top/bottom adjustment boxes (identified as #2/4 and #5/7 respectively in the Adjustment boxes for item resizing and positioning table above). The values entered into these boxes represent a portion of the total percentage (or pixels) of the layout's width or height.

Alternatively, you can position your layout items using the keyboard by selecting the item with your mouse cursor, and pressing the arrow keys to move the selected item by 5% in any direction.

You can also position your item with additional keyboard precision by **holding Ctrl and pressing the arrow keys** to nudge your item by a very small fraction in the direction of your choice.

Note that there is no one way to move and resize your layout items. The examples below are simply descriptions of one or two ways one might resize and/or position layout items.

Example 1: horizontal positioning using percents

To position your item along the horizontal axis, first resize your items if desired (as described in Resize layout items), then enter a percent or pixel value into either the left or the right adjustment box to shift your layout item.

For example, using **percents** to move a layout item with a 60% width as far to the right of the layout area as possible, you would need to enter 40% into the left percent box to push the item to the right. The layout item originally takes up 60% of the layout width, so this added 40% shift pushes the item as far to the right as possible (I.e. 100% of the horizontal axis).
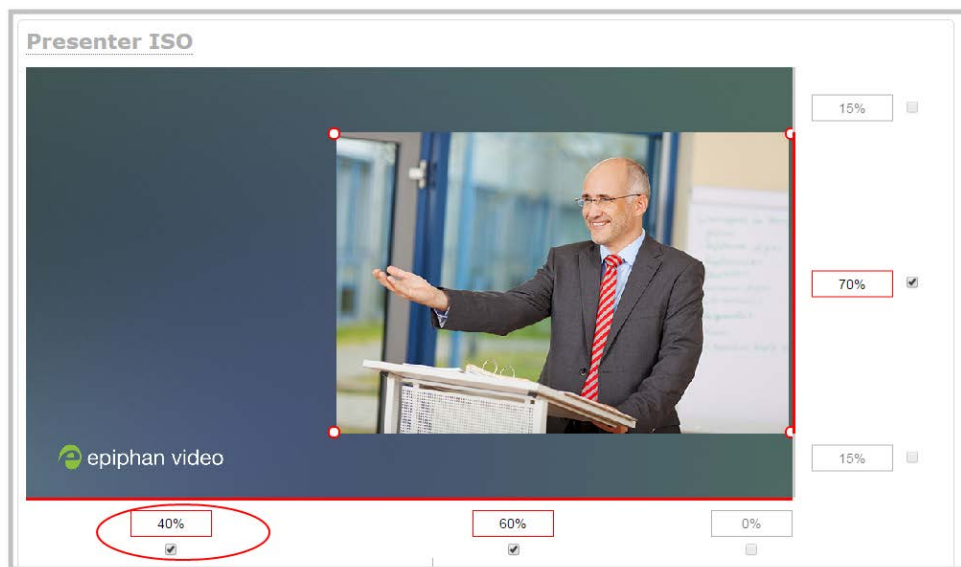
The right adjustment box automatically sets itself to 0% to reflect that there is more no room remaining to maneuver the image along the horizontal axis any further. Alternatively, you could reposition the image in the exact same way by instead setting the right percent box to 0%.

Example 2: vertical positioning using pixels

To position your layout item along the vertical axis, enter a percent or pixel value into either the top or the bottom adjustment box to shift your layout item downward or upward, respectively.

> For example, using **pixels** to move a layout item that is set to 756px in height to the top of the layout while leaving a small margin of background (say 25px), you could either enter "25px" into the top percent box (to specify the small margin from the top down) or enter 27% into the bottom percent box (to specify a 27% margin from the bottom up – added to the item's 70% height this leaves a 3% margin above your layout item.)
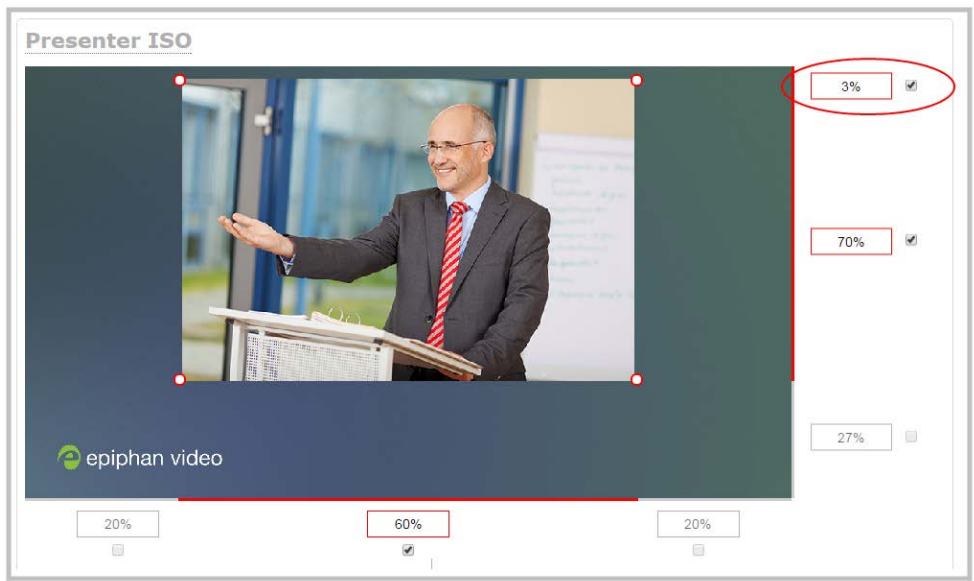
You can manipulate elements to get the custom look that you want using percents, pixels, your keyboard, or any combination. Here's an example of using pixels and percents to created a custom layout with two video sources and a background image.

Open the custom layout editor for a channel

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor opens.

3. From the Layouts list, select the layout you want to edit. The layout editor updates to display the selected layout and the row for the selected layout is highlighted in green.

   If this is a new or an unformatted layout, the layout area is empty and a black background matte appears.

Add or edit a custom layout

If you want to do live switching on your channel for a more dynamic video presentation, then you need to add different layouts that you can switch between. We recommend that you rename your channel and layouts to something more intuitive rather than using the default names, see Rename a channel and Rename a layout.

Creating layouts gives you full control over what's presented to your viewers. You can do things like change the size and position of images, add custom backgrounds, up scale and downscale your video sources, add multiple audio source and text overlays to mention just a few.

Important considerations:

If you're live switching your channel, we recommend that you set the frame size to a fixed size instead of using the default automatic detection of source frame size. Setting the frame size to a fixed value ensures you don't experience any stream interruptions if the source frame size changes due to layouts that contain a single video source that has a different frame size than those in other layouts, see Configure video encoding.

To add or edit a custom layout for a channel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor page opens.

3. Select a layout from the layout list or click **Add Layout** to create a new layout. If this is a new channel or layout, the layout area is empty and you see a black background matte. See Add video sources or a channel as a source
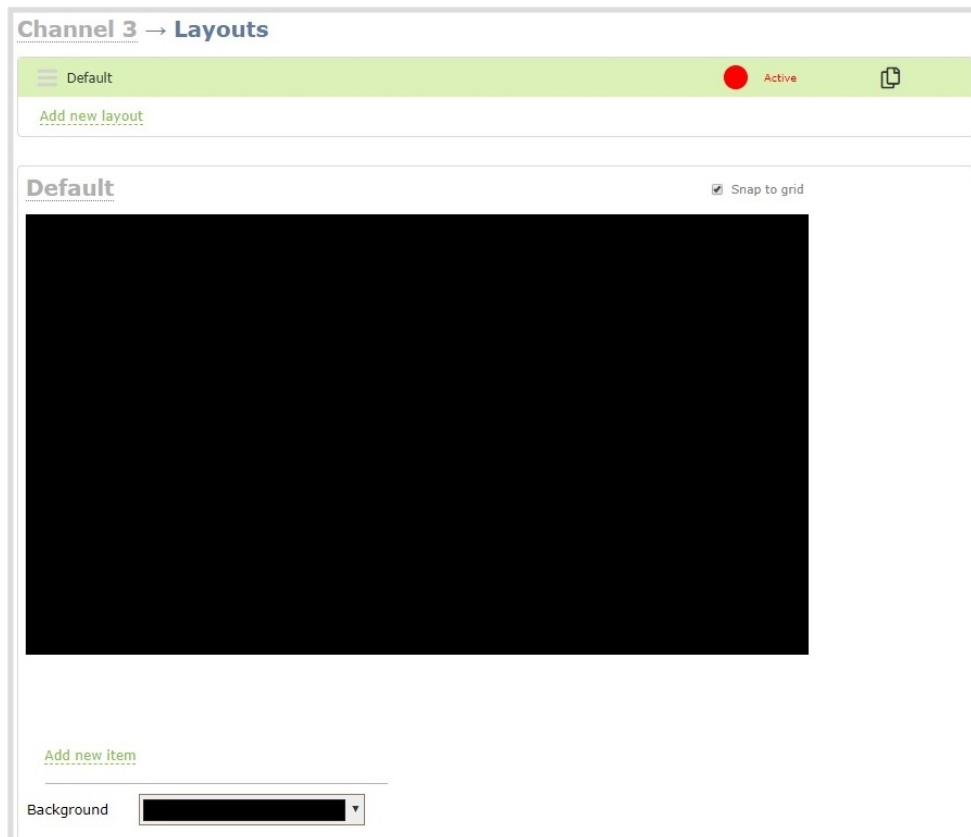
4. Click and drag the red and white handles on the corners of the video source to re-size it in the layout editor area.
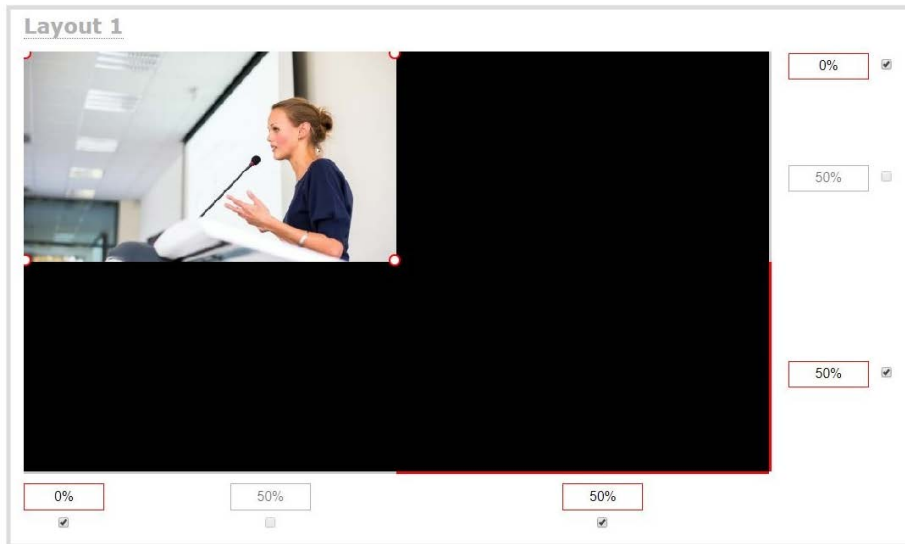
5. Click **Save** when you're done or continue to add additional video sources to the layout, resize and crop each video source to exactly how you want them to appear.

Rename a layout

You can rename any layout, even the currently active layout. Layouts you create are automatically given a default name. The first layout is called Default. You can the name using the custom layout editor.

> If you're using the touch screen for live switching, consider using shortened names for layouts. Long names get truncated on the touch screen.

To rename a layout:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor opens.

3. From the layout list at the top of the page, click on the row to select a layout. The layout appears in the layout area.

4. Click the name of the layout. The name turns red.
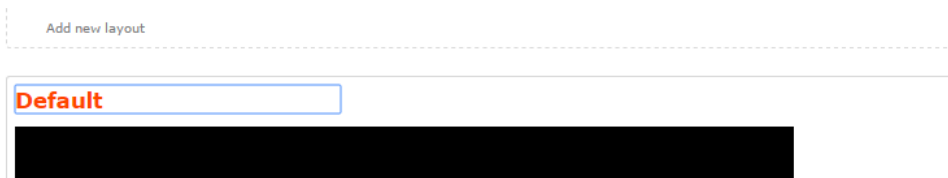
5. Enter a new name and press **Enter**.

Delete, move, or duplicate a layout

Layouts appear listed in the layouts list in the same order that they are presented on the touch screen. It's simple to re-order, remove, and duplicate layouts using the custom layout editor.

Reorder layouts

To move a layout:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor opens.

3. In the layouts list, click and drag the icon with the three horizontal bars at the left side of the row to rearrange the order of your layouts.

Delete layouts

You can delete any layout except the currently active layout.

To delete a layout:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor opens.

3. Click the **X** at the right side of the row for the layout you want to delete. The system prompts you to make sure you want to delete the layout.

4. Click **OK**.

> When using the switcher on Epiphan Live, refresh your browser if you still see a layout that was
> deleted. The deleted layout should disappear.

Duplicate layouts

If you're planning to use live switching, we strongly recommend you rename the channel rather than using the
default channel name, see Rename a channel.

To duplicate a layout:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor opens.

3. Click the double folder icon at the right side of the row for the layout you want to duplicate. A duplicate
    of the layout is added at the bottom of the list.

4. Click **OK**.

Important note for channels with multiple layouts

The two default channels are named HDMI-A and HDMI-B. Each has a default layout with the corresponding
HDMI-A (or HDMI-B) video and audio sources already assigned. By default, when a channel includes only one
layout that has a single video source, the default channel name is assigned the name of the video source.

When you add a second layout to the channel, the channel name automatically changes to a generic name
Channel *X*, where *X* is the channel index number. For example, HDMI-A changes to Channel 1.

Changing the channel name affects system operation.

- If the channel is streaming, the stream is stopped and restarted.

- If the channel's recorder is recording, then recording is stopped and a new file is started.

If you delete all the layouts in a channel until there is only one layout left and that layout has only one video source assigned, then the channel name changes back to the name of the video source. For example, Channel 1 changes to HDMI-A

To avoid channel name changes, we recommend that you rename the channel to a custom name. Changing the channel name to a custom name ensures that no automatic channel renaming happens, see **Rename a channel**.

Set the background color

You can select the background color to fill any unused space in a layout using the custom layout editor. For example you can add a color from your corporate color scheme.

To set a background color matte for a layout:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layout**. The custom layout editor opens.

3. Click the drop down arrow next to the existing (by default black) background color field. The color picker opens.
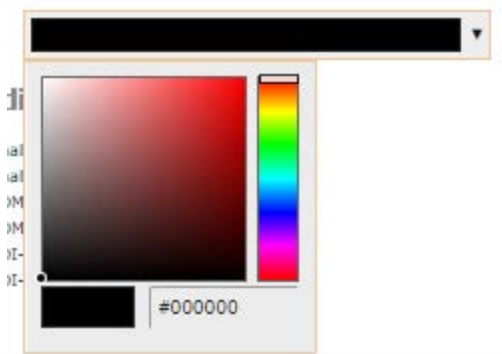
4. Pick a new color or type in an RGB value in the field; the color is updated in the layout area.

5. Click anywhere off the color picker to close the picker.

6. Click **Save**.

Add an image to a layout

You can add images to a layout using the custom layout editor. Use images to create a background for your source, to add your corporate logo, or to add relevant information about the event you're streaming.

Pearl Mini supports png (PNG) and .jpg (JPEG) images. You can upload images that are 16×16 pixels to a maximum image size of 4096×4096; however it's strongly recommended that you upload exactly the size you need to avoid image scaling.

Images can be uploaded in advance from the Media page, see Upload or remove an image using the Media page. Otherwise, you can drag and drop to upload an image using the custom layout editor. Note that no warning is displayed if the image is too large or if an image exists with the same name using drag and drop. The file will be replaced with the new image you upload.

> If your uploaded image does not appear in the list, ensure it doesn't exceed the maximum image size of 4096×4096.

To add an image to your layout:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor opens.

3. Click **Add item** and choose **Picture** from the drop down. The picture settings appears.

4. Select an image from the **Use image** drop down. To upload the image, drag and drop it from your desktop to the gray **Please select picture** area. For best results, keep the **Keep aspect ratio when scaling** check box selected (default).
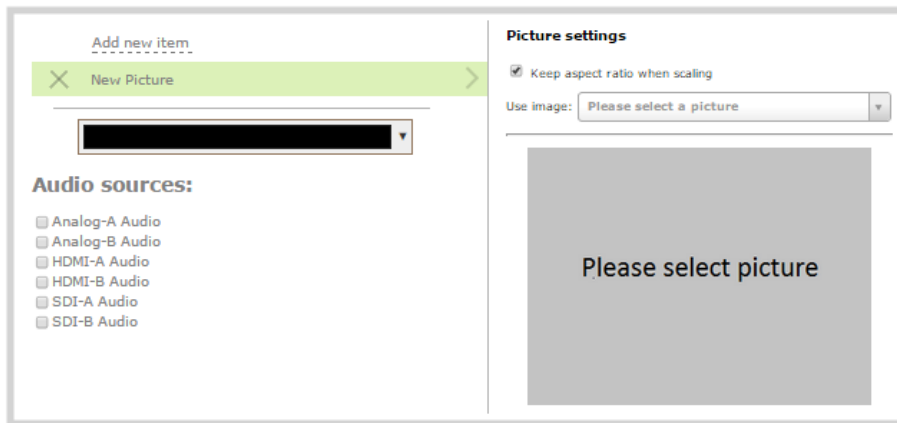
For best results, check **Keep aspect ratio when scaling** in the **Source settings**.

5. Your picture appears in the **Picture settings** preview and is added to the layout area.
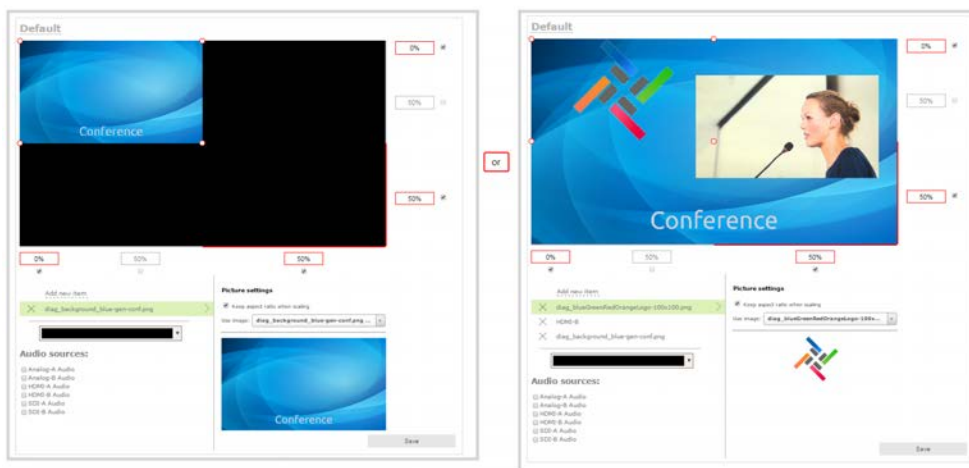
6. In the layout area, use the mouse, the keyboard or the manual position value fields to position and resize your image. For background images, click and drag to fill the full layout area. For more details, see About the custom layout editor.
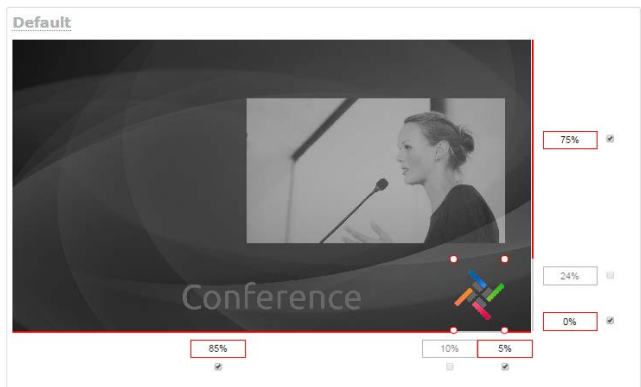
7. Re-order the items in your layout by clicking and dragging items in the item list.

> To layer video sources over top of each other, like for background images or a transparent logo, you can click and drag elements that appear in the item list beneath **Add new item** and change their order. Items that are higher up the list appear over top items that are lower down the list.

8. Click **Save**.

Upload or remove an image using the Media page

You can customize your channels by adding pictures as backgrounds, overlays, or transparent overlays. Image files formats supported include: PNG and JPEG.

The maximum supported image size is 3840×2160. No warning or error message is displayed if your image is too large. Files that exceed the maximum size won't appear in the drop-down list.
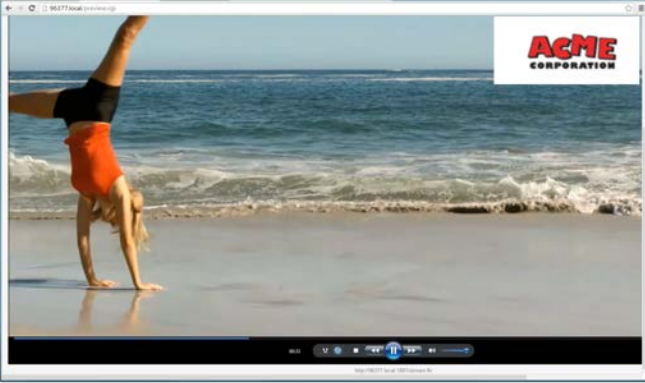
> For best results always upload images that are already the correct size needed in your layout. Background images should match the frame size of your channel (frame size is set in the **Encoding** configuration page).

There are two ways to upload images. You can upload images using the Media page or drag and drop your image in to a layout using the custom layout editor, see Add an image to a layout. Uploading an image of the same name overwrites the existing image.

To upload or remove an image using the Media page:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Media**. The Media page opens.
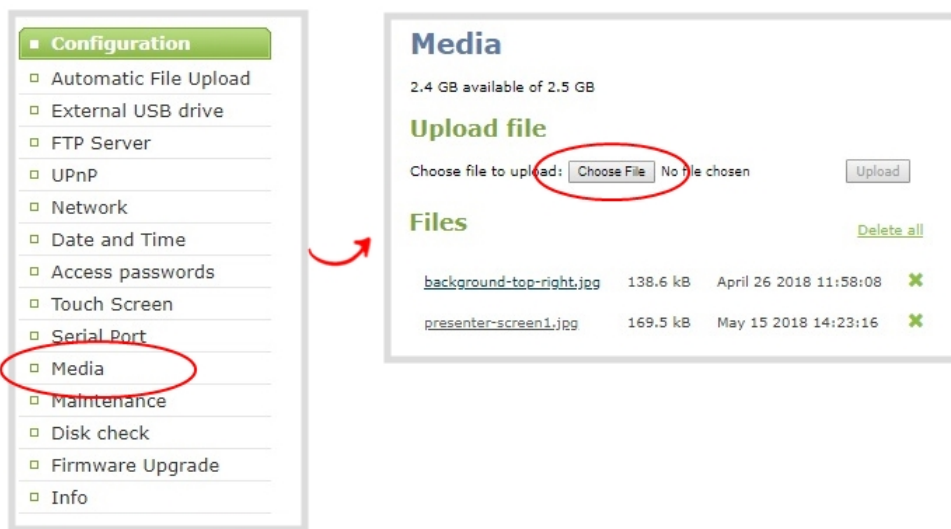
3. To upload a file, click **Choose File** and browse to select the file to upload, then click **Upload**.

4. To remove a file, click **Remove** beside the file name and click **OK** when prompted.

> If you delete an image that is used as part of the layout for any channel, select a different image or no image by using the drop-down list in the **Picture settings** box within that channel's layout before deleting the file using the steps below.

Add a text overlay

Text overlays are useful to add information like a title, location, or the date and time in to layouts in your channel. You can add text to any layout using the custom layout editor. The following tables lists shortcut

codes that you can enter and the resulting content that appears on screen.

Table 39 Overlay text shortcut codes

Item	Shortcut code	Example
date	%F	2012-01-26
year	%G	2012
month (01)	%m	01
month (Jan)	%b	Jan
month (January)	%B	January
day of the month	%d	26
weekday (Thu)	%a	Thu
weekday (Thursday)	%A	Thursday
time	%T	08:40:45
hour	%k	08
minute	%M	40
second	%S	45
millisecond	%#m	378
channel name	%c	Camera Feed 1

> If you use a non-monospaced font, the size of the text overlay changes as the letters, numbers, and the length of words change. Use a monospaced font to maintain a consistent size for the text overlay (assuming the total number of characters in the text string doesn't change).

To add a text overlay to your layout:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor opens.

3. Click **Add new item** and select **Text**. The new item is added to the layout area and to the top of the list of items. The Text settings also appear.
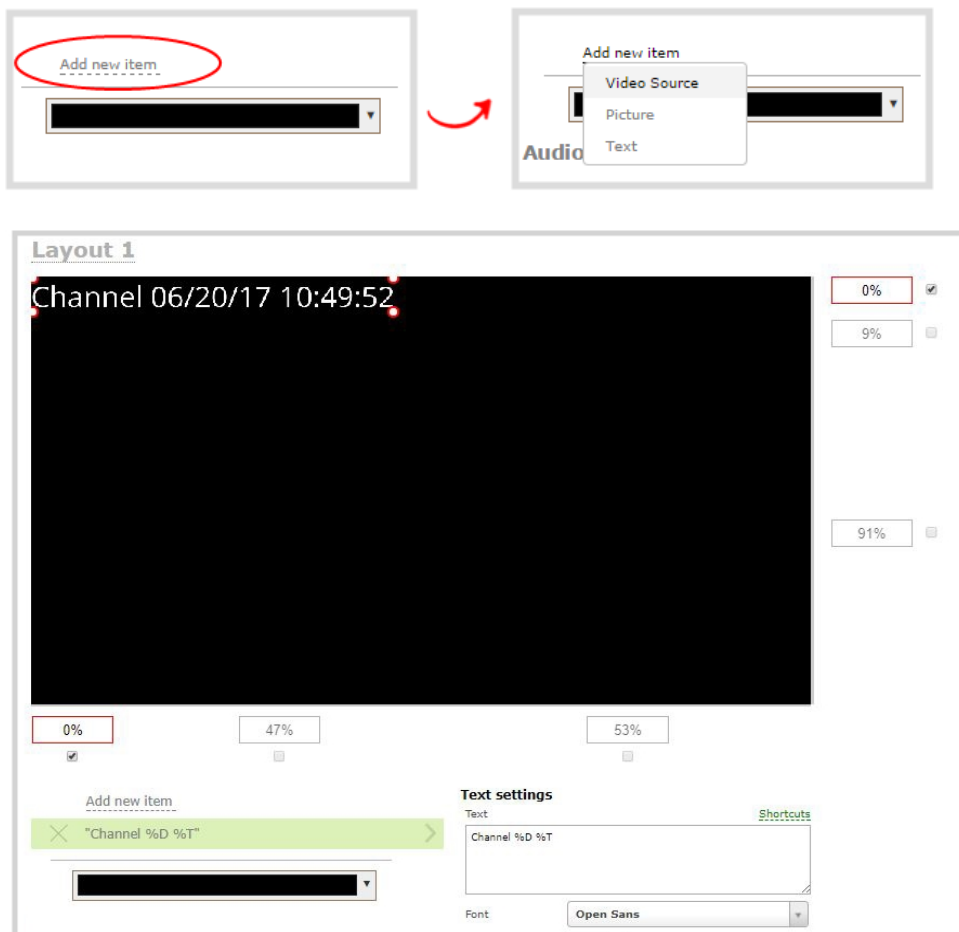
> You can change the order in which items appear on the layout area by re-arranging the order the items appear in the list beneath **Add new item**. Items at the top of the list appear in front, and items lower down the list appear behind.

4. In the **Text** field, type what you want to appear in the text overlay. Include Overlay text shortcut codes as needed. Press **Tab** or click outside the text field to refresh the preview in the custom layout editor.

   For example, if you enter:
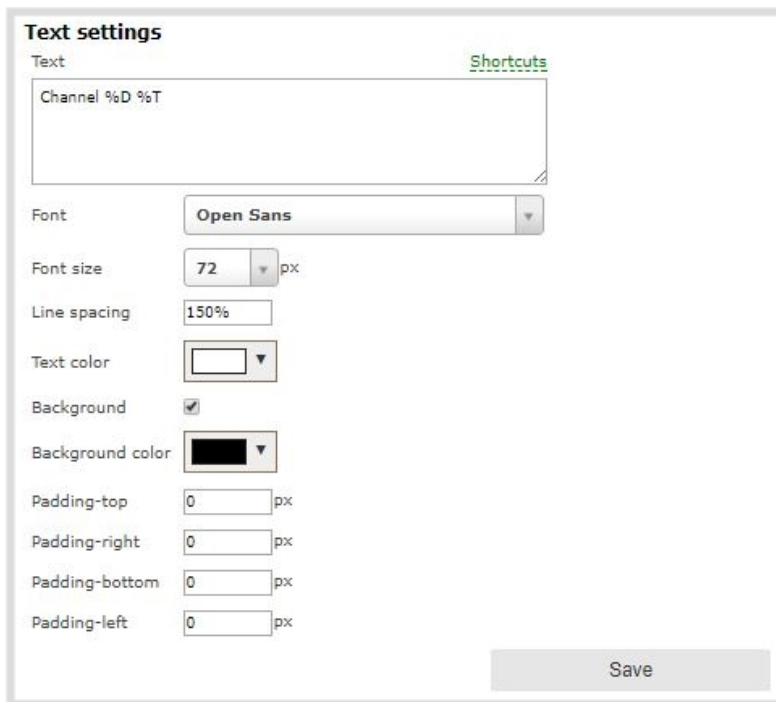
```
%A %B %d, %G. Live streaming channel Auto A.
```

   The resulting text is displayed:

5. Select the **Font**, **Font size**, and **Text color**. You can also change the default **Line spacing** in percentages. For a mono-spaced font, use Droid Sans Mono.

> ✅ **Limitations**: The maximum supported text size is 500 px. Padding values must not exceed the frame size. Do not enter negative padding values.

Text settings

Text	Shortcuts

Channel %D %T

Font	Open Sans ▼
Font size	72 ▼ px
Line spacing	150%
Text color	▼
Background	☑
Background color	▼
Padding-top	0 px
Padding-right	0 px
Padding-bottom	0 px
Padding-left	0 px

Save

6. Resize the overlay text box using the padding settings.

> ✅ The handles on the corner of the overlay text box are not click-and-drag and do not resize the text box. To resize the text box, use the padding fields to add space above, below, and on either side of the text.

7. In the layout area, click and drag to move the overlay text box or enter values in the manual position value fields along the side and bottom of the layout area.

8. Click **Save**.

Custom system variables for text overlays

You can create your own custom system variables using the HTTP API, which you can then use in text overlays. This is useful to add custom overlay text that changes throughout the course of your live stream or

recorded program.

For example, using the HTTP API you can create a system variable for the current GPS co-ordinates, then use a script to update the GPS co-ordinates in your custom variable as the physical location in your stream changes.

Here's an example custom variable called "gpsvar1" that has a value of "N103 68201 W765 29712". To insert the "gpsvar1" variable into a text overlay, you'd simply type **%(gpsvar1)** into the **Text** field.
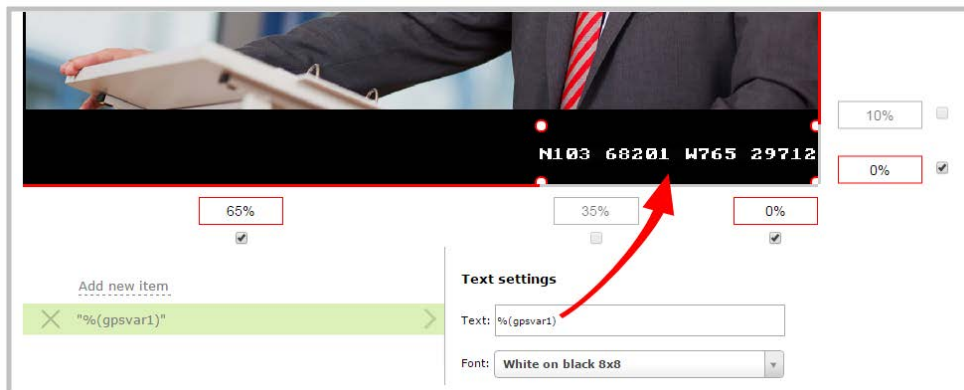
System variable commands are issued at a frequency of **5 per second**. You can include up to 6 variables in a single set command. After issuing a set command, all channels using the specified variables are updated. System variables are considered volatile and are deleted when the system reboots. See Controlling Pearl Mini using HTTP commands to learn more about global variable HTTP command syntax for custom layouts.

> If you use a non-monospaced font, the size of the text overlay changes depending on the characters in the content and the number of characters. To maintain a consistent size for the text overlay in the layout area, use a monospaced font and make sure the number of characters doesn't change.

For more informatoin about sizing and positioning elements in the custom layout editor area, see About the custom layout editor.

Crop a video source

You can crop a video source to change the size and shape of your video as it appears on screen using the custom layout editor. Cropping a source gives you a lot of advantages and can help to conserve the overall amount of processing CPU usage for your Pearl Mini.

To crop a source in your layout:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor opens.

3. Select a video source from the items list. The **Source settings** appears.
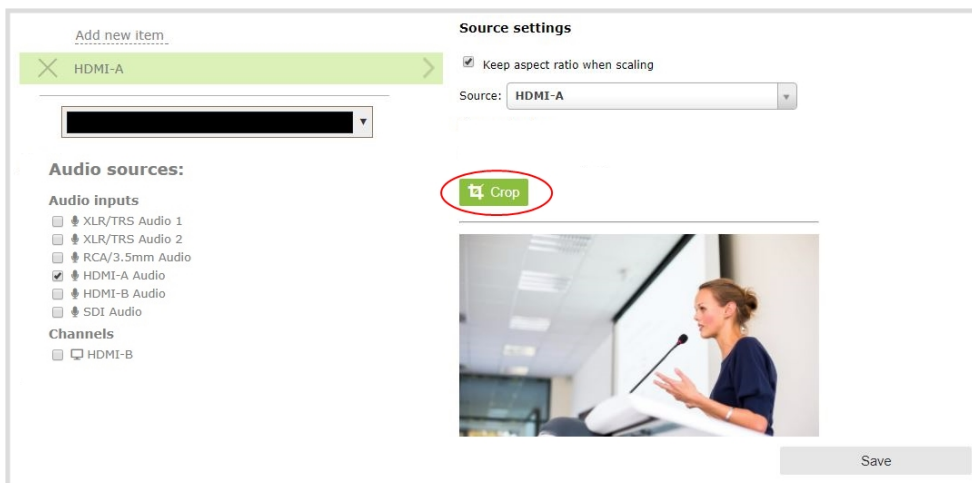
4. Click **Crop**. Your video source appears in a pop-up editing window.

5. The **Crop** window has several tools for creating the best crop possible.

    - **Free form** is the default crop mode. In this mode, you can change the size, aspect ratio, and position of the crop with minimal restrictions.

    - The red box with click-and-drag circular handles in the corners shows the cropped area that appears in the final layout. Only the content inside the box shows in the layout. In **Free form**

mode, you can click and drag the red handles to change the size and ratio of the box, and you can click and drag the box itself to change its position. When you have selected an aspect ratio, you can alter the size by dragging the red handles. When you have selected a size, you can change its position by dragging the box.

- The number boxes allow you to make precise crops. Click the text boxes and enter a number to determine how many pixels of distance from the edge that line is drawn. You can also erase the "px" after the number and type in "%" to manipulate the box using percentages. For more details on how these boxes work, see Resize and position items using percents or pixels.

- To create a crop with a specific resolution, choose a **Size** from the available list. This creates a box with that exact resolution. Click and drag the box to move it into position. The size cannot be changed except by selecting a different size, or by selecting **Free form** or **Aspect Ratio**.

- Selecting an aspect ratio allows you to create a crop box of almost any size in a particular ratio. After selecting a ratio, you can manipulate the crop area's size and position without changing its shape.

6. Click **OK** to close the crop window.

7. Click **Save**.

> You can also manipulate the crop-box using keyboard controls. You can move the crop box using the arrow keys, and holding **Ctrl** or **Shift** while resizing the box keeps the aspect ratio of the box constant. Hold **Shift** and use the arrow keys to move one side of the box while leaving the other in the same location.

Video and audio input sources

The Admin panel automatically discovers all video and audio sources that you connect to the input ports on Pearl Mini and lists them in the Inputs menu of the Admin panel.

A source's content can be video, a picture, or music from a connected audio mixer and can originate from a camera, computer screen, an imported image in Pearl Mini, or a device that provides an PearlVideoInputs signal with audio.

> Video sources are also displayed on the Epiphan Live control interface. See **Monitor video and audio input sources** for more information.

Topics include:

- About connecting video and audio sources

- Preview a video source using the Admin Panel

- Rename an input port

- Configure a video input source

- Add a custom No Signal image

For instructions to configure an audio input and adjust audio gain or delay, see Audio input ports

About connecting video and audio sources

You can physically connect your video sources to Pearl Mini at any time, either before or after the system is powered on. Similarly, you can disconnect a source from an input port and even connect a different source at any time.

Changing the video or audio source that is being streamed or recorded can result in the recording stopping or the stream frame size changing depending on how your channel is configured. If the frame size changes, viewers may be disconnected and need to re-connect to the stream.

Connect your video and audio sources to the following input ports on your system:

Table 40 *Cable and port connections*

Source type	Input port
SDI	SDI port
HDMI (HDCP-protected) or DVI	HDMI port

Source type	Input port
Audio	Audio input port: XLR, ¼" TRS, 3.5 mm, or RCA

Each video input on the back of the system is identified by an A or B and input type. For example, the HDMI input labeled A appears as HDMI-A in the Web UI. It's good practice to preview the video source for each of your inputs using the Admin panel.

When a video source is connected, the system automatically detects and adjusts the image capture settings every 60 seconds. The interval is configurable. Generally no further configuration is needed; however you can fine tune some settings using the Admin panel.

If no video source is connected to an input port, "No Signal" displays wherever that input is used in your channels and layouts. You can change that to display the default "No Signal" image for Pearl Mini or create your own custom no signal image. See Add a custom No Signal image .

The Admin panel automatically discovers all video and audio sources that you connect to the input ports on Pearl Mini and lists them in the Inputs menu of the Admin panel.
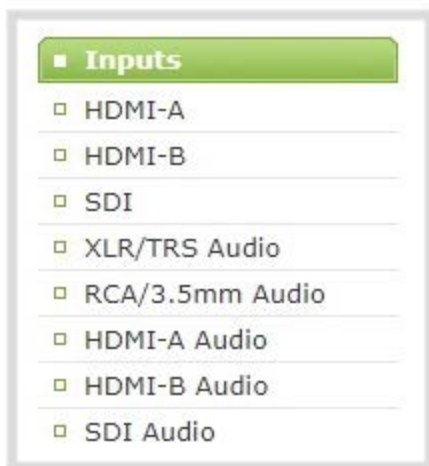
Pearl Mini's Admin panel automatically discovers all audio sources and displays them in the same section.

Professional microphones and other mic-level audio devices can be connected to the XLR and 3.5 mm (stereo) audio input ports on Pearl Mini. Audio mixers and other line-level audio devices can be connected to the RCA and ¼" TRS audio input ports on Pearl Mini. Audio from sources connected to the HDMI and SDI ports is also supported. For specifications, and guidance when connecting an audio source, see Tech specs and Selecting an audio source.

Preview a video source using the Admin Panel

You can preview the images captured from your video sources in the Admin panel. You can also preview your sources using the Epiphan Live control interface, see Monitor video and audio input sources.

To preview an input source using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. Ensure a source is connected to the input port.

3. From the Inputs menu, click the **source name**. The configuration page for the source opens. A preview appears at the bottom of the page.
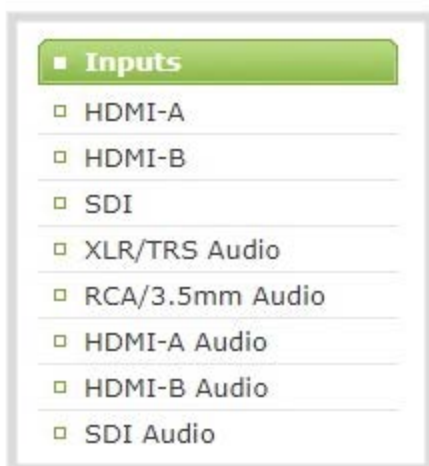
Rename an input port

The input port names are used when adding your video and audio sources to channels. A channel that has only one source is automatically assigned the same name as the input source by default. If you change the name of the input source, the channel name will update automatically to match.

Sometimes it's helpful to configure the input port name to match the data it's capturing so that it's clear what the channel is capturing. Alternately you can change the channel's name, see Rename a channel.

To change an input port name:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Inputs menu, click the **source name**. The configuration page for the source opens.
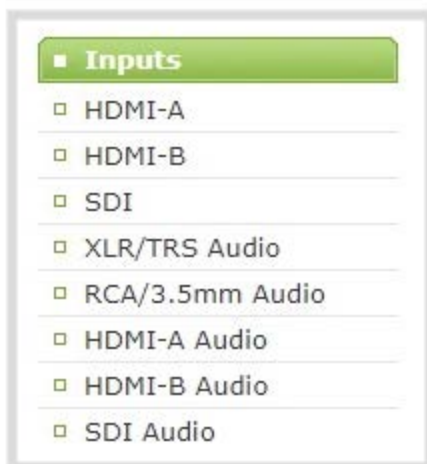
3. Click on the input port's name that appears at the top of the page. The text turns red.

4. Enter the new name using alphanumeric characters. We recommend using underscores to separate words rather than using spaces.

5. Press **Enter** using your keyboard to save the new name.

Configure a video input source

The captured video source doesn't usually need configuration, but you can change some of the settings using Admin panel.

To open the configuration page for an input source:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. Ensure a source is connected to the input port, see About connecting video and audio sources.

3. From the Inputs menu, click the **source name**. The configuration page for the source opens.

DVI and HDMI signals

The following options are available for DVI and HDMI signals via the HDMI port:
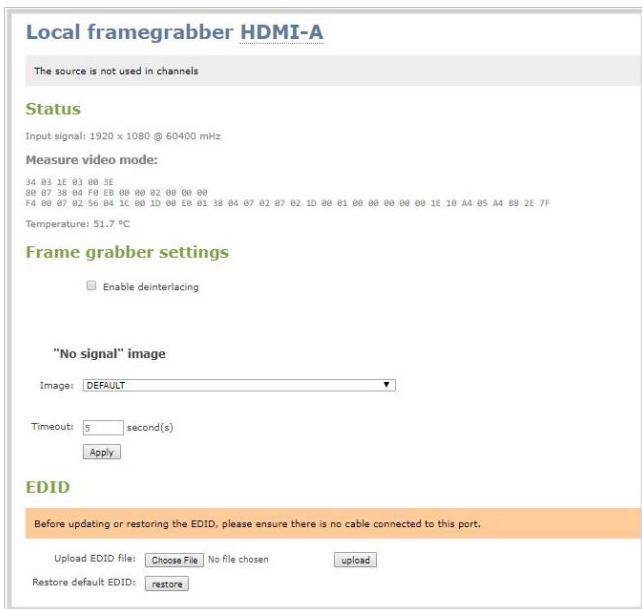
Value	Description
Enable deinterlacing	Enable this feature to convert an interlaced source signal to a non-interlaced signal.
Image	This menu allows you to choose a custom no-signal image for the channel. The drop-down list gives you the option to choose the default image or any image you have uploaded through the Add a custom No Signal image
Timeout	The timeout represents the number of seconds after losing the signal that the no-signal is displayed. You may change this number to adjust how soon you wish the no-signal image to appear after the signal disappears.

SDI signals

The following options are available for signals via the SDI port.

Value	Description
Image	This menu allows you to choose a custom no-signal image for the channel. The drop-down list gives you the option to choose the default image or any image you have uploaded through the Add a custom No Signal image
Timeout	The timeout represents the number of seconds after losing the signal that the no-signal is displayed. You may change this number to adjust how soon you wish the no-signal image to appear after the signal disappears.

Add a custom No Signal image

By default the system displays a No Signal image when there is no video signal coming in to any of the video input ports on Pearl Mini. You can customize this image to display a different message to your viewers. For example if a viewer logs in early, or if you are experiencing delays you could indicate the start time (or expected resolution time) using the no signal image.

Before you can specify a custom No Signal image for an input port on Pearl Mini, you must upload it, see Upload or remove an image using the Media page.

To set the no signal image for an input port:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Inputs menu, click the **source name**. The configuration page for the source opens.

3. In the **"No signal" image** section, select an image from the **Image** drop down list.
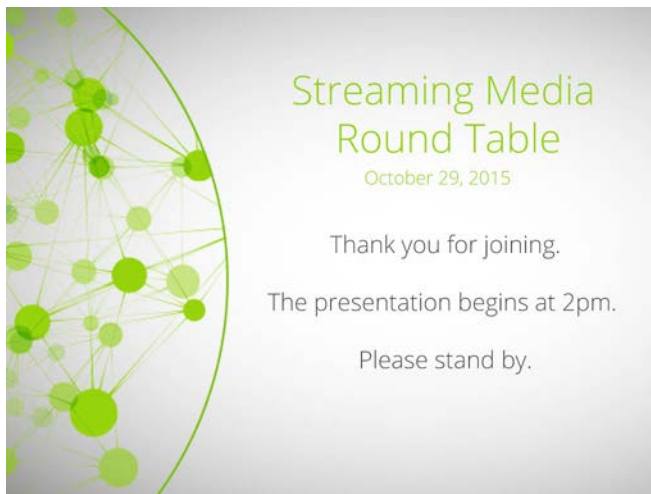
4. In the Timeout field, enter the number of seconds before the No Signal image is displayed. If no manual value is entered, the default time to display is 5 seconds.

5. Click **Apply**.

6. Test that the No Signal image is correctly applied by disconnecting your source and previewing the channel(s) containing said source, see Preview channel.

PART 3: Stream

Streaming is a powerful way to deliver live video content to your viewers. Stream to viewers, servers, and media players. Using the Admin panel, you can configure streaming in multiple formats to multiple destinations and devices, such as web browsers, media players, set-top-boxes, Smart TVs, and Content Distribution Networks.

Pearl Mini is flexible, easy to setup, and supports all the standard codecs, as well as the most common media players. Streaming options include: unicast, multicast, CDN, SAP, UPnP, and more.

Topics include:

- What is streaming?
- View supported streaming formats
- Directly share stream URLs with viewers
- Stream settings for video and slides
- Streaming a channel directly to viewers
- Streaming to a server
- Stream to a media player or smart TV

What is streaming?

After you connect your camera, audio source, and set up a channel that consists of a single video source or a whole switched program with multiple custom layouts, it's time to stream your content and share that with your viewers.

Pearl Mini provides many different options for streaming, including unicast, multicast, CDN, SAP, UPnP and more. The streaming method you use will depend on your audience's location, hardware resources, and available bandwidth. To help you choose, identify the number of viewers you have and determine how they will access your stream.

Pearl Mini can stream to individual viewers using HTTP, HTTP Live Streaming, UPnP, and RTSP. At the same time, Pearl Mini can stream to a server, such as a multicast server or CDN.

You can easily start and stop streaming using One touch control from the touch screen on Pearl Mini (see Specify channels for One Touch streaming) or control streaming from the Admin panel. You can even control your live stream using Epiphan Live (see Control streaming and recording).

Considerations

- Are you streaming live video or recorded video?

- Where are you streaming too?

- Do you need to stream the content to one client (peer-to-peer) or deliver a single stream to multiple clients (multicast)?

- Do you need to provide web-based streaming that multiple clients can access using a Content Distribution Network (CDN), such as YouTube or Facebook Live?

Stream settings for video and slides

Stream setup is a matter of balancing quality and system resources. When choosing your stream settings, it's important to consider the type of content you're streaming. For fast moving video, choose a higher bitrate and frame rate. If you're streaming a slide presentation, you can save bandwidth and system processing by lowering the bitrate and frame rate.

The following table provides suggested settings to maximize your video quality while minimizing system resource usage when streaming video content from your Pearl Mini.

Table 41 *Suggested stream settings for video*

Option	Setting
Codec	H.264
Video encoding preset	Hardware accelerated
Video encoding profile	High
Key frame interval	2 sec
Limit frame rate	30
Bitrate	4000 kbps for HD 6000 kbps for Full HD 4000 kbps for HD; 6000 kbps for Full HD (Mac)
Audio format	AAC 22 KHz

The following table provides suggested settings to maximize your stream quality while minimizing system resource usage when streaming slide presentation content from a PC, Mac, or tablet.

Table 42 *Suggested stream settings for slides*

Option	Setting
Codec	H.264
Video encoding preset	Hardware accelerated
Video encoding profile	High
Key frame interval	2 sec

Option	Setting
Limit frame rate	30
Bitrate	1000 kbps for HD; 2000 kbps for Full HD
Audio format	AAC 44 KHz

View supported streaming formats

When you set up your channel, the system generates and displays a list of available video formats and standards specific to the selected audio and video codecs that you configured for your channel. You can view the available streaming formats from the channel status page using the Admin panel.

To view the video formats and standards that are specific to your selected codec:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Status**. The status menu opens. All available stream protocols that are supported based on the selected codecs for the channel are listed.

Streaming a channel directly to viewers

You can stream any channel on Pearl Mini directly to your viewers, who can tune in and watch your program using their web browser or media player.

Table 43 *Publishing options for streaming to viewers*

Publishing Options	Use this option to...
HTTP	Quickly stream content to viewers simultaneously. Pearl Mini is ready to stream content using the default streaming settings as soon as you've powered on the system and configured a channel. Your audience can access the URL of the broadcast and they are instantly connected. This streaming method is ideal for a small number of viewers. For each viewer, you are using the full stream bandwidth and a small amount of system overhead on the Pearl Mini. For more information about using a HTTP streaming, see Stream content using HTTP or RTSP.
RTSP	Quickly stream content to viewers. Pearl Mini is ready to stream content using the default streaming settings as soon as you've powered on the system and configured a channel. Your audience can copy and paste the URL of the stream into a media player. For more information about using RTSP streaming, see Stream content using HTTP or RTSP.

> To stream video outside of your LAN, you must configure port forwarding on your router. Consult with your Network Administrator.

To set up Pearl Mini for direct streaming to viewers, see:

- Disable and enable direct channel streaming
- Restrict viewer access to channel streams
- Stream content using HTTP or RTSP
- Configure HTTP and RTSP streaming ports
- Stream using UPnP

Stream content using HTTP or RTSP

The easiest way to deliver your content to your viewers is to give them the broadcast URL of the channel. You can get that using the Admin panel.

A separate URL exists for each channel you stream. The format of the URL depends on the method you used to access Pearl Mini, which can be done though network discovery using the serial number or the IP address of Pearl Mini.

Pearl Mini must be accessible on the viewer's LAN for them to access and view the stream by serial discovery.

> If Pearl Mini is behind a firewall and you want to share a stream with remote viewers, you need to set up port forwarding on your network. Consult with your network administrator.

Table 44 *URL options*

Access Method	URL Format
serial discovery	http://*\<serial\>*.local/preview.cgi?channel=\<channel number\> rtsp://*\<serial\>*.local:*\<port\>*/stream.sdp Where *serial* is the serial number of the system, the *port* number for the channel is found on the Info page, and the channel number is provided from the Admin panel. You must install **Bonjour Print Services** on your Windows or Mac computer to access the live Preview using the serial number.
IP address	http://*\<IP Address\>*/preview.cgi?channel=2 rtsp://*\<IP Address\>*:*\<port\>*/stream.sdp Where *IP address* is the IP address of the system, the *port* number for the channel is found on the Info page, and the channel number is provided from the Admin panel.

To retrieve the stream URL for your viewers:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channel menu, select a channel and click **Status**. The Status page appears.

3. Record the **Live Broadcast** , **RTSP stream** url or other web streaming address. This is the address you can send to viewers or use to create a link to your broadcast.

> **STOP** If you're seeing URLs with serial numbers instead of IP addresses and want to change this, log into the Admin panel by IP address (instead of by Serial number/Bonjour Print Services) to see URLs with the IP address, see **Connect to the Admin panel**.

Directly share stream URLs with viewers

Participants can view a channel's stream directly from Pearl Mini when you provide them the channel's stream URL and log in credentials. You can provide separate URLs for streams coming from each channel, or one URL that includes all the streams for the channel.

Choose the right type of URL for the type of device the participant will use to view the stream. For more information on compatibility between codec and file formats, see View supported streaming formats.

To share the channel's stream URL directly with viewers:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select the channel and click **Status**. The Status page opens.

MPEG-TS: Used in broadcast systems sych as DVB, ATSC and IPTV. It is supported by media players such as MPlayer, VLC and KMPlayer.

RTSP: Supported by most media players including QuickTime, MPlayer and VLC. Supports H.264 and MPEG4 standards and analog audio from an external source.

Stream info

Live broadcast: http://192.168.0.183/preview.cgi?channel=1

Video: H.264 1920x1080@30, 6.47 Mbps
Actual framerate: 30
Audio: AAC 44kHz stereo 320 kbps
Total: 6.79 Mbps
RTSP stream rtsp://192.168.0.183:554/stream.sdp
MPEG-TS stream http://192.168.0.183:8000/stream.ts
Flash stream http://192.168.0.183:8000/stream.flv

ASF: Supported on Windows Media Player. Additional codecs may be needed to view ASF streams. Supports H.264 and MPEG4 standards. Supports analog audio from an external source.

FLV: Supported on most web browsers and media players. Supports the H.264 standard and analog audio from an external source.

3. Copy the URL and provide that to viewers.

Viewers can now view the stream using a digital media player or browser, see View the live broadcast URL using a web browser and View the streaming URL using a media player.

View the live broadcast URL using a web browser

You can share a channel's live broadcast URL with viewers so they can watch your live stream using their favorite web browser. Your viewers must be on the same network as Pearl Mini to watch a live broadcast using the channel's live broadcast URL.

🛑 If the channel you're streaming is configured with 48 kHz audio, some web browsers may not work. In this case, we recommend viewing the channel steam using a media player instead.

The live broadcast URL appears in two places in the Admin panel:

- On the channel's status page.

- On the Info page from the Configuration menu.

To locate the IP address for the broadcast, see Directly share stream URLs with viewers.

If a viewer password is configured, provide participants with the password to log in, along with the URL of the stream. To set a viewer password, see Set or change user passwords.

To share the live broadcast URL with viewers:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2. Open the channel's status page and copy the live broadcast URL. From the Channels menu, select a channel and click **Status**. You can copy the Live broadcast URL and share that with your viewers.
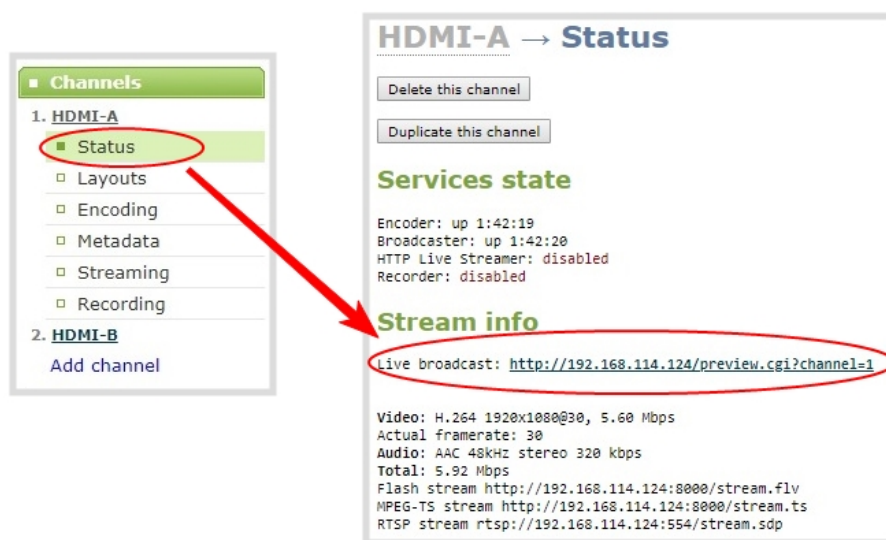
3. Alternatively, open the **Info** page to get the live broadcast URL. From the Configuration menu, click **Info** and then click **View** for the channel you want to share the broadcast URL.

A page opens displaying the live broadcast and the broadcast URL. Copy the URL and share that with your viewers.

To watch a stream using a web browser and the live broadcast URL:

1. From your web browser, enter the IP address of the live broadcast stream.

> If the IP address of the broadcast is 172.20.1.33, then browse to:
> http:// 172.20.1.33/preview.cgi?channel=<channel number>

2. Enter **viewer** as the user name and the password when prompted and press **Enter**. The stream plays in a new tab in your web browser.

View the streaming URL using a media player

You can share a channel's streaming URL with viewers so they can watch your live stream using their favorite media player, like VLC. Your viewers must be on the same network as Pearl Mini to watch a channel stream using a stream URL.

The different stream types available for channels include: RTSP, MPEG-TS, and Flash streams, see View supported streaming formats. The URL contains either the IP address of Pearl Mini or the serial number, see

The type of stream URL you provide to your viewers can affect their choice of media player needed to watch the stream.

This procedure assumes that the VLC media player is used.

If a viewer password is configured, provide participants with the password to log in, along with the URL of the stream. To set a viewer password, see Set or change user passwords.

To share the channel's stream URL with viewers:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2. Open the channel's status page and copy the channel's stream URL. From the Channels menu, select a channel and click **Status**. You can copy the Live broadcast URL and share that with your viewers.
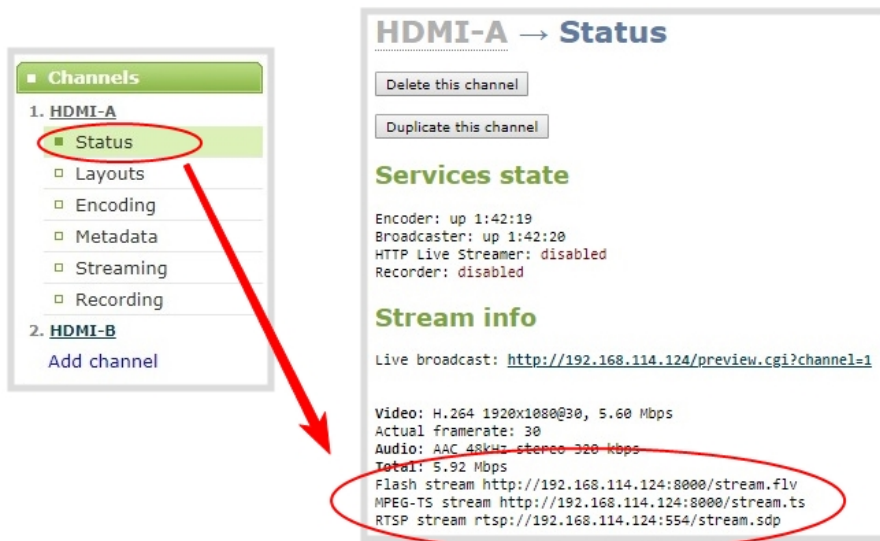
To view the channel's stream URL using a VLC:

1. Launch a media player.

2. Click the **Media** tab and select **Open Network Stream** from the drop-down menu.

3. Enter the stream URL. In this example, the serial number method is shown.

rtsp://.local:554/stream.sdp
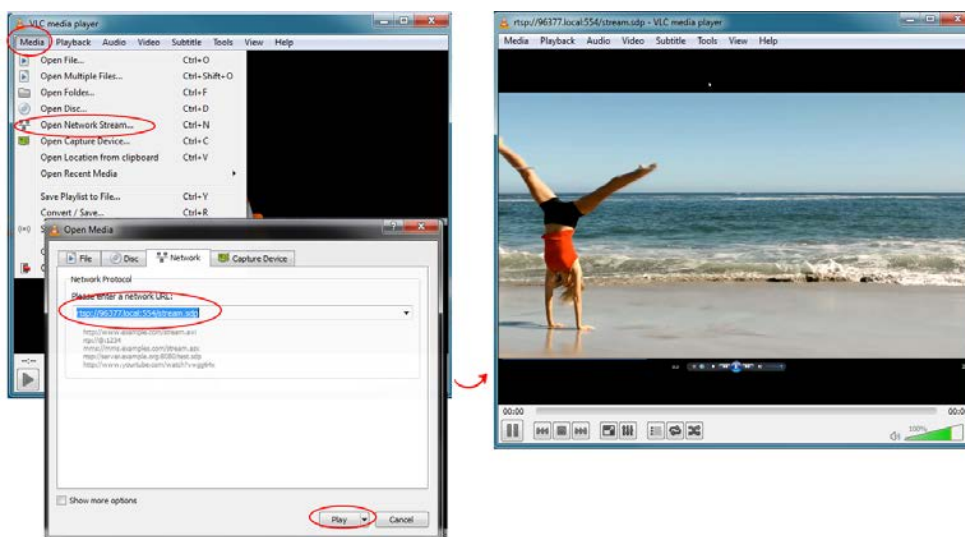
4. Press **Play** to watch the stream in the media player window.

Configure HTTP and RTSP streaming ports

For RTSP streaming directly to users on your LAN the only information required to view the broadcast is the URL and the port number used to stream the broadcast.

Port numbers are also used for HTTP streaming methods such as FLV and MPEG-TS. By default, each channel has a unique HTTP and RTSP port number. If needed, you can modify these port numbers. Be sure to always use unique numbers for each channel.

To set the HTTP and RTSP streaming ports for streaming to viewers on the same network, follow the steps below.

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Streaming**. The Streaming page opens.
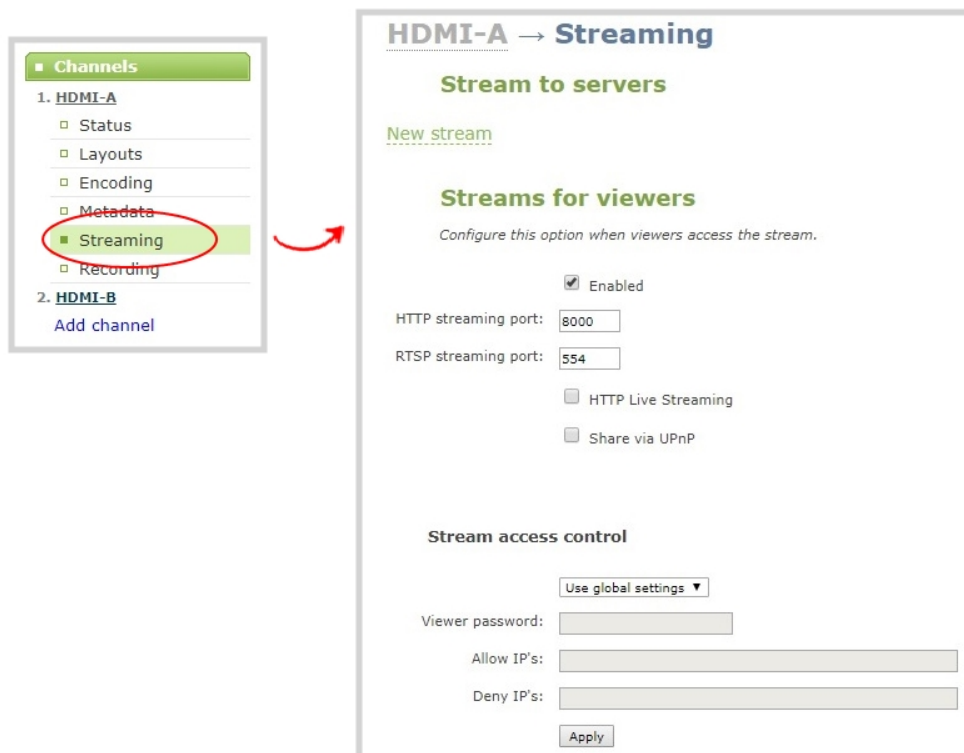
3. Set the **HTTP Streaming port** to specify the port used to stream the HTTP broadcast. This value along with the URL is used by viewers to access the FLV and MPEG-TS streams.

> The port number must be higher than 500 for HTTP. In the case of RTSP streaming this value is ignored.

4. Set the **RTSP Streaming port** to specify which port to use when you are streaming live video via RTSP. This value along with the URL is used by viewers to access the broadcast. The default for channel one is 554.

5. Click **Apply**.

Disable and enable direct channel streaming

When you create a channel, the channel's streaming URLs are enabled by default. The channel streaming URLs are listed on the Status page for the channel, which you can share with viewers. You can disable channel streaming using the channel's streaming URLs from the Streaming configuration page using the Admin panel.

Disabling channel streaming for viewers using their web browser or media player does not disable live streaming to a CDN.

> Disabling streams for viewers does disable all viewer formats, including: HTTP, RTSP, HLS and UPnP.

To disable or enable the channel streaming URLs:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Streaming**. The streaming page opens.
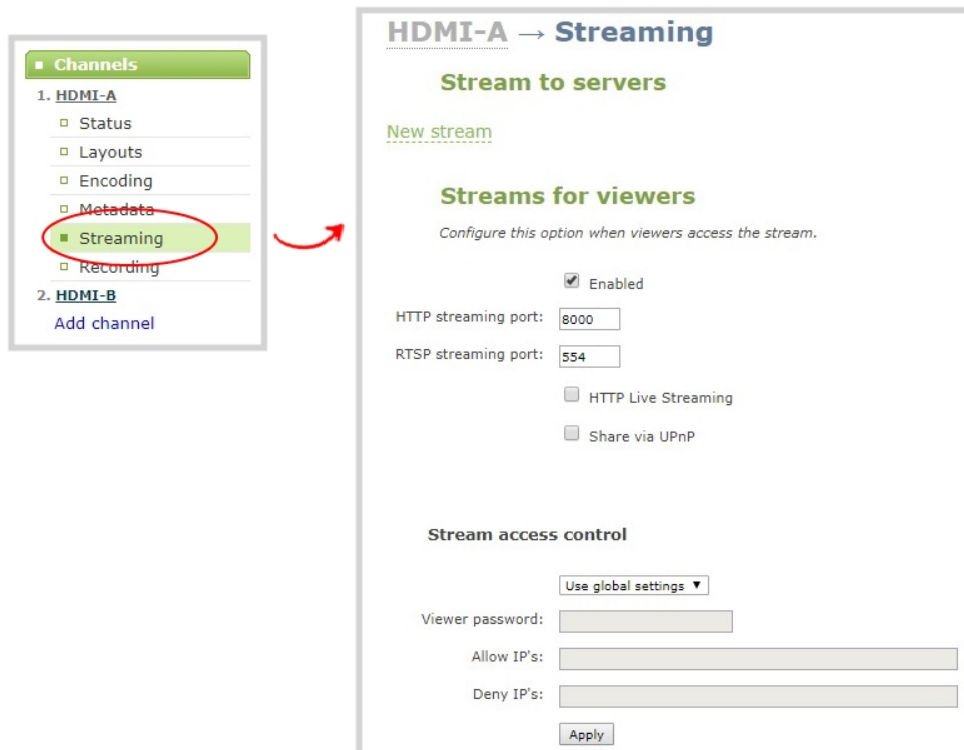
3. Uncheck **Enabled** to disable direct streaming of channels to viewers using the channel's streaming URLs. Leave **Enable** checked to allow direct streaming using the channel's URLs.

4. Click **Apply**.

Restrict viewer access to channel streams

Pearl Mini can restrict access to all viewer streams from the channels on Pearl Mini using global viewer passwords and IP allow/deny lists. See Set or change user passwords and Restrict viewers by IP address.

> 🛑 If LDAP is configured for viewer authentication, the viewer must pass global autentication using LDAP credentials (or the viewer global password, if there is one) and must meet the local channel settings (come from an allowed IP address). See **Configure LDAP user authentication** for more information on LDAP configuration.

To restrict viewers for a channel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

3. From the Channels menu, select a channel and click **Streaming**. The streaming configuration page opens.

4. In the **Stream access control** section, select **Use these settings** from the drop down.

To return the channel to the global access control settings, select **Use global settings** from the drop down and click **Apply**. The configuration fields are disabled and any changes to the configuration fields are not saved.

> 🛑 Global LDAP settings are always enforced. Any local settings are in addition to LDAP sign on.

5. (Optional) Specify a password for viewers of this channel. The password is masked as you enter it.

> 📋 If you have global allow/deny lists or a global user password, you can override the global settings and remove all access control for a channel by selecting **Use these settings** and leaving all the fields blank.

6. (Optional) Enter the allow and deny IP addresses for viewers of this channel. See Restrict viewers by IP address for details about allow and deny lists.

7. Click **Apply**.

Restrict viewers by IP address

Pearl Mini permits you to restrict which computers can access broadcasts by building a list of allowed and denied IP addresses. You can do this at a global level for the system and can also override these settings on a per-channel basis. Both global and per-channel configuration procedures are described.

The following table describes what happens when an IP address is added to the allowed and denied IP address lists.

Item	Description
Allow IP's	Users connecting from addresses in this list are permitted to view broadcasts from the system, provided their IP address is not in the Deny IP's list. To allow all except IP addresses in the deny list, if any, leave the field blank. You can use the Allow list by itself, or in conjunction with the Deny IP's list as an exception to a rule in the allow list.
Deny IP's	Users connecting from addresses in this list are not allowed to view broadcasts from the system, unless their IP address is in the Allow IP's list. If a specific IP address is in both lists, access to the stream is denied. You can use the Deny list by itself, or in conjunction with the Allow IP's list as an exception to a rule in the allow list.

If your viewer account has a password, your viewers must connect to the system from a computer (or gateway) with a permitted IP address and must also supply the user name (viewer) and password before they can view the broadcast.

To restrict access by IP address, you need to know the IP addresses or range of addresses for your viewers. By default, all IP addresses are allowed to connect to the broadcast.

If a user attempts to connect to the stream from a disallowed IP address, access is denied. If there's an attempt to connect using a web browser, the message "IP address rejected" is displayed.

Table 45 *IP Based Restriction Options*

If you're not familiar with creating allow/deny lists, see IP restriction examples.

> IP address restriction is valid for the viewer only and does not affect the Admin panel or the mobile configuration interface.

To restrict viewer access to watch streams for all channels by their IP address:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, select **Access passwords**. The password configuration page opens.
3. Enter the allowed IP addresses or address ranges in the **Allow IP's** field and enter denied IP addresses or address ranges in the **Deny IP's** field. Separate addresses with a comma. To specify a range, use a hyphen (-). Optional spaces improve readability.
4. Click **Apply**.

To restrict viewer access to watch streams on a specific channel by their IP address:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Streaming**. The channel's streaming configuration page opens.

3. From the **Access Control** drop-down, select **Use these Settings** to enable local password and Allow/Deny IP lists are enabled.

4. (Optional) Enter a password for the viewer in the **Viewer Password** field.

5. Enter the allowed IP addresses or address ranges in the **Allow IP's** field and enter denied IP addresses or address ranges in the **Deny IP's** field. Separate addresses with a comma. To specify a range, use a hyphen (-). Optional spaces improve readability.

6. Click **Apply**.

IP restriction examples

The following table lists some example allow lists.

Table 46 *Example allow lists*

Example	Description
Allow list with distinct IP addresses	The simplest allow/deny list is to use the list of known IP addresses to craft a list of allowed IP addresses. All other addresses are denied access to the broadcast.
	For example if your system is accessible on your local area network (LAN) and you want to make sure only the CEO's specific desktop, laptop and tablet computers (with IP Addresses 192.168.1.50, 192.168.1.51, and 192.165.1.75, respectively) can connect to the broadcast, construct the following allow list:
	Allow: 192.168.1.50, 192.168.1.51, 192.168.1.75
Allow list with a range of IP addresses	Sometimes you'll want a range of computer IP addresses to connect to your system. This may happen when you have one range of IP addresses assigned to desktop computers (i.e. in the range 192.168.1.1 to 192.168.1.100) and another range assigned to boardroom computers (i.e. the range 192.168.1.200 to 192.168.1.250). If you only want the boardroom computers to connect to broadcasts from the system you can specify the range of boardroom IP addresses rather than needing to type in each individual address. The allow list looks as follows:

Example	Description
	 Allow: 192.168.1.200-192.168.1.250 Note that we could have specified two of the IP addresses in the previous example as a range.
Allow list with a range of IP addresses and one or more specific IP addresses	Putting the first two examples together, we want to permit access to IP addresses in the range of boardroom computers (192.168.1.200-192.168.1.250) and also want to add the desktop, laptop and tablet computers of the CEO (IP addresses 192.168.1.50, 192.168.1.51, and 192.168.1.75, respectively). Note the first two IP addresses are consecutive, so they can be added as a second range. Add these IP addresses to the list as follows: Allow: 192.168.1.200-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75 Your list can have multiple ranges and multiple distinct IP addresses, provided they are separated by commas.
Allow list with a range of IP addresses, distinct IP addresses, and an exception	Building on the previous examples, consider a situation where you want the CEO's computers (192.168.1.50, 192.168.1.51, 192.168.75) and all boardroom computers (192.168.1.200-192.168.1.250) to access the broadcast, with the exception of the public boardroom computer (192.168.1.211). Use both allow and deny lists to create the rule as follows: Allow: 192.168.1.200-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75 Deny: 192.168.1.211 Both lists can have multiple ranges and multiple distinct IP addresses, provided they are separated by commas.

The following table lists some example deny lists.

Table 47 *Example deny lists*

Example	Description
Deny list with distinct IP addresses	Another simple allow/deny list is to use the list of known IP addresses to list specific denied IP addresses. All other addresses are allowed access to the broadcast. For example imagine your system is accessible on your local area network (LAN) and you want to allow any computer on the LAN can access the stream except your publicly-accessible boardroom (with IP address 192.168.1.211). You can use the following deny list (leave the allow list empty) to permit all computers except the boardroom computer: Deny: 192.168.1.211 As with allow lists, your deny list can specify a range of IP addresses, and can specify multiple ranges or distinct IP addresses in a comma-separated list.
Deny list with a range of IP addresses	Consider a situation where you want every computer on the network to access the broadcast, with the exception of the CEO's desktop, laptop and tablet computers. Additionally, boardroom computers should not be permitted with the exception of the cafeteria computer (IP address 192.168.1.222). The deny list is an "exception" list for the allow list. So to craft the rule described above we need to allow all the computers in the local subnet, then deny specific sub-ranges including two groups of boardroom computers ensuring the cafeteria computer's IP address is not in the deny list: Allow: 192.168.1.1-192.168.1.250 Deny: 192.168.1.200-192.168.1.221, 192.168.1.223-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75

Streaming to a server

Your Pearl Mini streams to a server when you want to use a CDN or Multicast. Streaming a channel to CDNs and multicast streaming is available only when the H.264 codec is configured as the channel encoding, see Configure video encoding.

By default, no server streaming is configured. See Stream to a CDN and Stream using multicast for details on configuring one of these two options.

Publishing Options	Use this option to...
Content Distribution Network (CDN)	Stream web content to many viewers on different Content Delivery Networks simultaneously to any geographical location. A viewer accesses the broadcast from a website using a user name and password, if required. Using a CDN to host your broadcast is highly scalable and makes financial sense to website owners since you do not pay for additional server hardware or routing should your network traffic increase or decrease. Using one or more CDNs to stream live content allows you to reach a large geographically diverse audience and because CDNs perform format conversion, the stream is platform independent. You can control when streaming to a CDN is enabled by using the Admin panel or the touch screen, see Start and stop streaming to a CDN. For more information about streaming to a CDN, see Stream to a CDN.
Multicast Streaming	Stream content to a multicast IP address where it can be shared with multiple viewers within the same LAN. All viewers receive the same stream at the same time. Similar to turning on a radio station where all listeners hear the same music at the same time. This delivery method relies on network equipment that supports multicasting and is usually used in high bandwidth corporate LANs and not on Internet-based architectures. This delivery method is useful for training sessions, when there is a specific timeframe when the audience will view the content. For more information about using multicasting for streaming your content, see Stream using multicast. This option can be used to stream video and audio to an IP TV or set top box playlist.

> To stream video outside of your LAN, use a CDN or configure port forwarding on your router.
> Consult your Network Administrator to set up port forwarding.

Stream to a CDN

A Content Delivery Network (CDN) relies on geo-diverse CDN servers to receive and disperse web content to the CDN server closest to the user. The closer the server is to the user, the faster the content is delivered. Streaming your content through a CDN allows you to stream any time, anywhere, regardless of the viewing device.
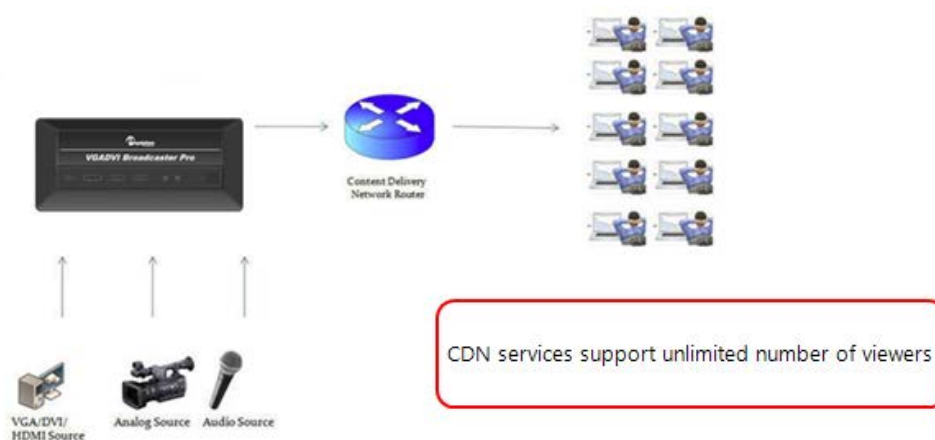
You can publish to any CDN provider that supports incoming streams sent via RTSP announce or RTMP push, and you can publish to several different CDNs simultaneously. Both RTSP and RTMP can be used for live streaming, however not all CDNs or media servers support both formats. Choose the streaming format that your CDN or media server supports. Epiphan has tested with the CDN providers listed here: https://www.epiphan.com/partners/cdn-partners/. Contact your CDN for a list of supported audio codecs and ensure your Encoding configuration uses one of the supported codecs.

To publish content to a CDN provider, ensure you have:

- a path to the mount point or an XML configuration file (provided by the CDN provider);
- verify which transport protocols your CDN supports;
- a current flash player; and
- select the H.264 codec from the channel's Encoding page.

You can control when streaming to a CDN is enabled by using the Admin panel or the touch screen. See Start and stop streaming to a CDN.

You can also test how your content is streamed by sending your content to Epiphan's CDN. For a list of Epiphan's preferred CDN providers, see: https://www.epiphan.com/partners/cdn-partners/.

Use one of the following links to configure your Pearl Mini for publishing to a CDN:
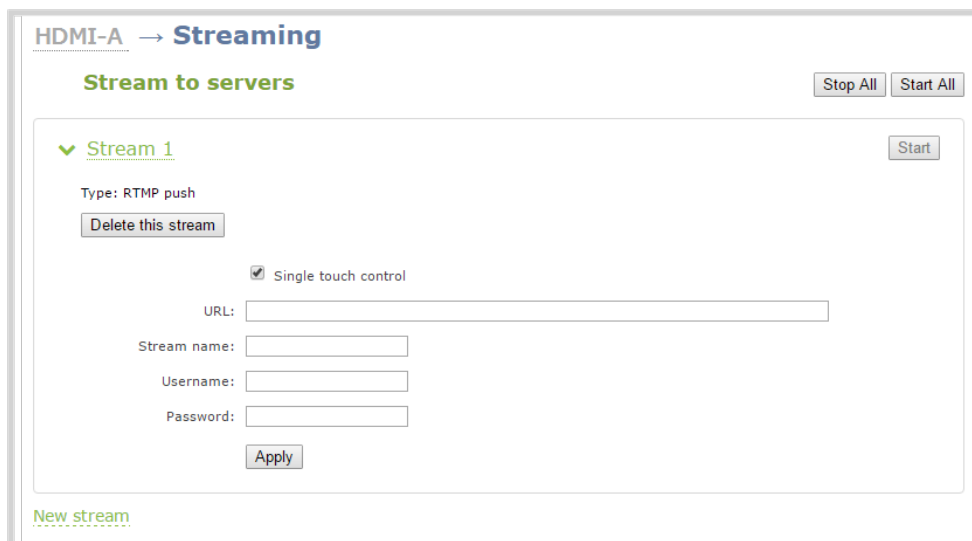
- Set up a stream using RTSP announce

- Set up a stream using RTMP push

- Stream to a CDN using an XML profile

- Stream to Wowza Streaming Cloud

Start and stop streaming to a CDN

After your CDN streaming is configured for RTMP, RTSP, Wowza Streaming Cloud, or Original Livestream, you can start and stop streaming using the Admin panel, the touch screen, or Epiphan Live.

To start and stop streaming using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Streaming**. The Streaming configuration page opens.

To set up a stream using the Admin panel, click **New stream** and follow the instructions for how to **Stream to a CDN**.

3. Click **Start** at the top right corner to start that stream, or click **Start all** at the top of the page to start streaming all streams that are configured for that channel.

4. Click **Stop** at the top right corner to stop that stream, or click **Stop all** at the top of the page to stop streaming for all streams that are configured for that channel.

You can tell if your channel is streaming from the touch screen on Pearl Mini when you look at the channel view or the Grid view. The following shows an example Grid view. The streaming LED on the front panel of Pearl Mini is solid on when streaming is in progress.

- A blue dot in the top right corner means the channel is currently streaming.

- A yellow dot with an exclamation mark means a problem with streaming occurred that requires attention.
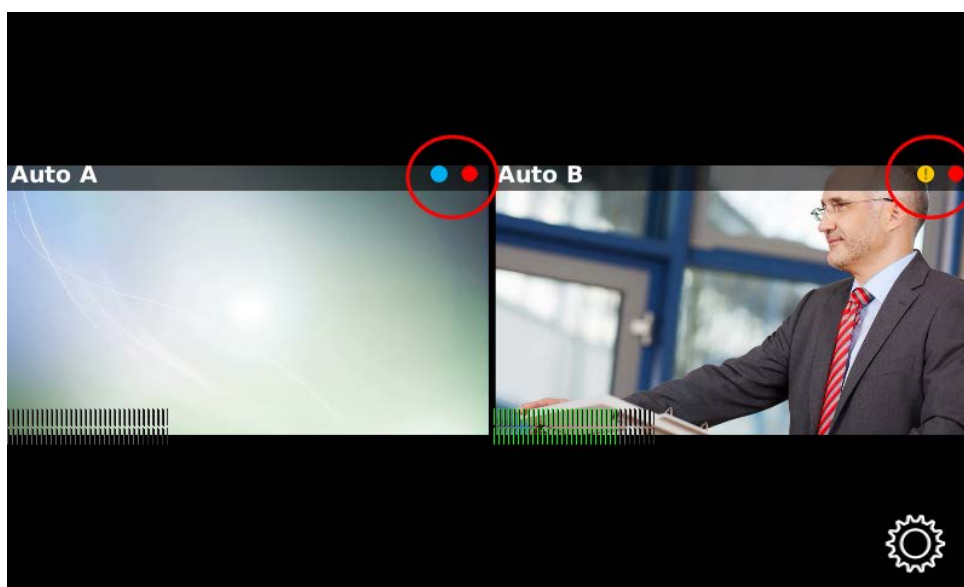
For details to start and stop streaming using the touch screen, see Stream a channel using the touch screen.

For details to start and stop streaming using Epiphan Live, see Control streaming and recording.

To learn how to use One Touch feature to control your recording and streaming across any number of specified channels and recorders simultaneously with the touch of a button, see About One Touch streaming and recording.

Set up a stream using RTMP push

This is the most common way to stream to a CDN, including both Facebook Live and YouTube.

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Streaming**. The Streaming configuration page opens.

3. Click **New stream** and choose **RTMP push**. The new stream is created using the default name Stream 1.
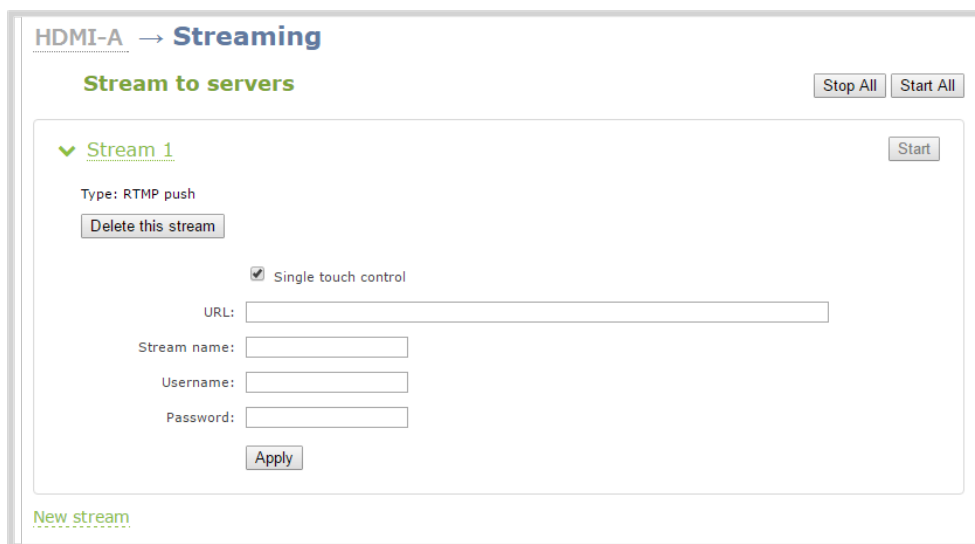
4. Click the stream name to see the stream settings.

5. (Optional) To rename the stream, click the current name and type a different name, then press **Enter**.

6. (Optional) Uncheck **Single touch control** if you don't want this stream to be started and stopped using One Touch streaming and recording control (checked by default).

7. Enter the following parameters:

- The **URL** of the ingestion point provided by the CDN or media server.

- The **Stream name** you configured with the CDN.

- The CDN **User name** and **Password** (if required).
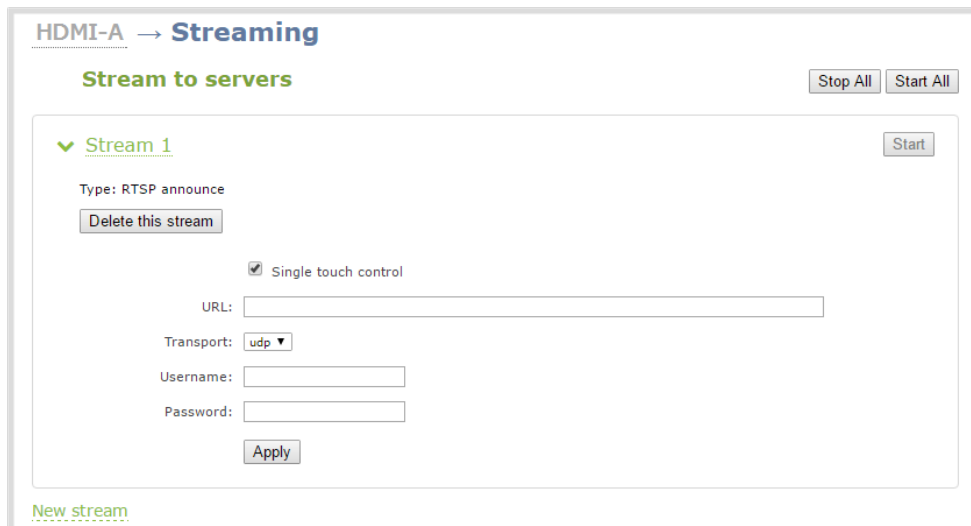
> The CDN provider assigns a user name and password to authenticate the publisher. Contact the CDN provider for your log in credentials. Some CDNs, like YouTube and Facebook Live, you do not need to enter your log in credentials here.

8. Click **Apply**.

9. To start streaming, click **Start** or click **Start all** to simultaneously start this stream and any other streams you have configured for this channel.

10. Click **Delete this stream** at any time to delete the stream.

See Start and stop streaming to a CDN for instructions to control streaming from the touch screen or see Control streaming and recording for instructions to use Epiphan Live.

Set up a stream using RTSP announce

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Streaming**. The Streaming configuration page opens.

3. Click **New stream** and choose **RTSP announce**. The new stream is created using the default name Stream 1.

4.   Click the stream name to see the stream settings.

5.   (Optional) To rename the stream, click the current name and type a different name, then press **Enter**.

6.   (Optional) Uncheck **Single touch control** if you don't want this stream to be started and stopped using One Touch streaming and recording control (checked by default).

7.   Enter the following parameters:

- The **URL** of the ingestion point provided by the CDN or media server.

- Select the **Transport type** as either UDP or TCP. Consult your CDN provider to find out which transport protocols the CDN supports.

- The CDN **User name** and **Password** (if required).

> The CDN provider assigns a user name and password to authenticate the publisher. Contact the CDN provider for your log in credentials.

8.   Click **Apply**.

9.   To start streaming, click **Start** or click **Start all** to simultaneously start this stream and any other streams you have configured for this channel.

10. Click **Delete this stream** at any time to delete the stream.

See Start and stop streaming to a CDN for instructions to control streaming from the touch screen or see Control streaming and recording for instructions to use Epiphan Live.

Stream to a CDN using an XML profile

Some CDNs provide an XML file for easy configuration.

To stream to a CDN using an XML profile:

1.   Login to the Admin panel as **admin**, see Connect to the Admin panel.

2.   From the Channels menu, select a channel and click **Streaming**. The Streaming configuration page opens.
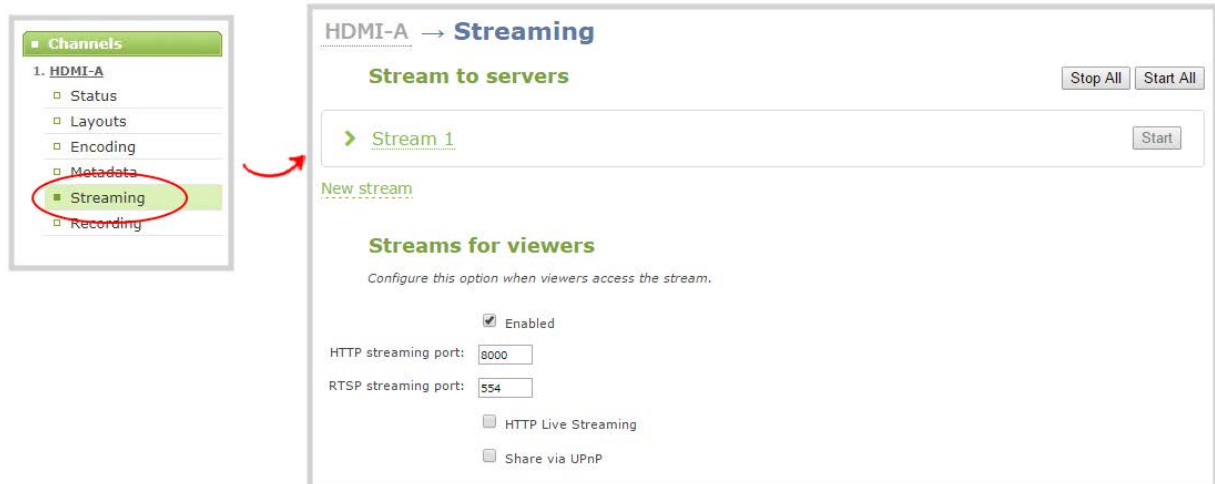
3. Click **New stream** and select **Use profile XML**.

4. Select the XML file that was provided by your CDN provider, then click **OK**. The new stream is created using the default name Stream 1 and the configuration from the XML file is applied.
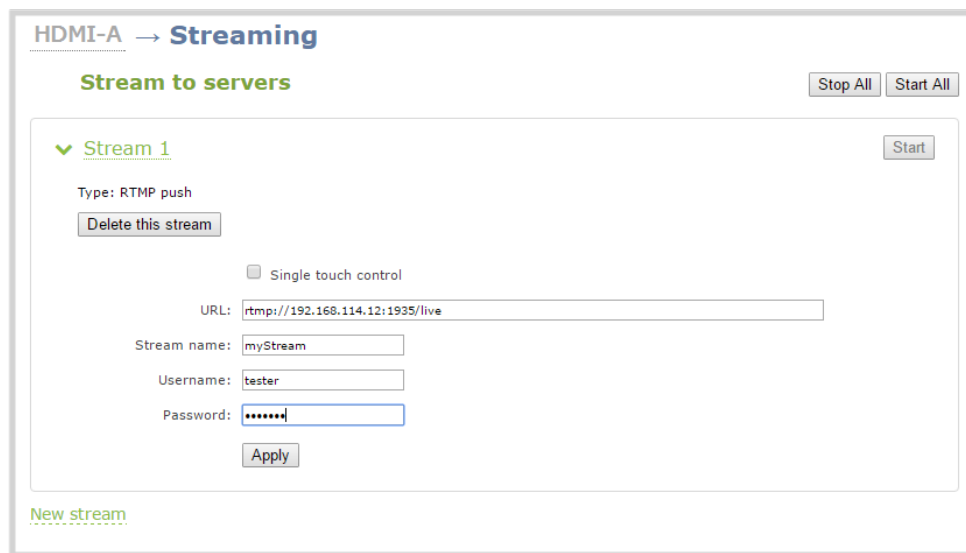
5. Click **Apply**.

6. To start streaming, click **Start** or click **Start all** to simultaneously start this stream and any other streams you have configured for this channel.

7. Click **Delete this stream** at any time to delete the stream.

See Start and stop streaming to a CDN for instructions to control streaming from the touch screen or see Control streaming and recording for instructions to use Epiphan Live.

Stream to Wowza Streaming Cloud

To set up streaming via Wowza Cloud, you first need to sign in to the Wowza Streaming Cloud web site and create a new Live Stream (when asked to select a camera or encoder type, select **Epiphan**).

Once the stream is created, you'll see a **Connection Code** on the stream's **Overview** page. This code is required to complete the streaming set-up process.

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Encoding**. The Encoding page opens.
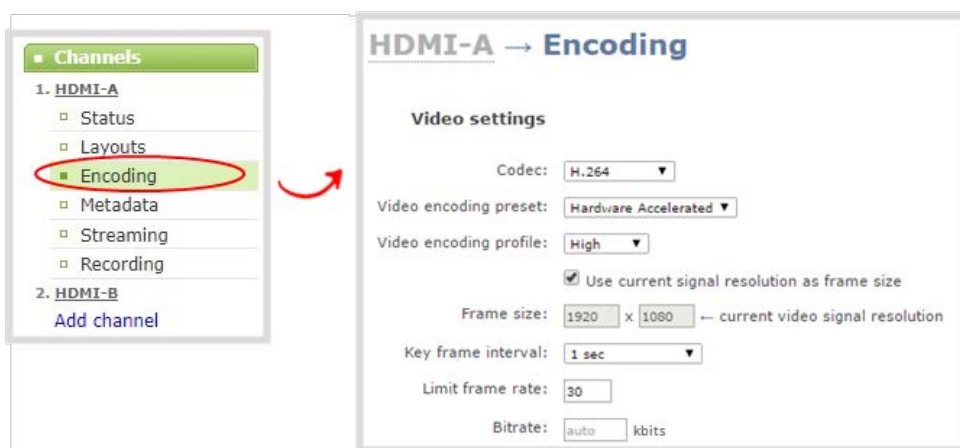
3. Configure the video Encoding settings and ensure that the **Codec** H.264 is selected.

> Configuring audio is optional. Supported formats are limited to MP3 and AAC. Due to RTMP restrictions, MP3 48 kHz is not supported.

4. Click **Apply**.

5. Click **Streaming** for the channel. The Streaming configuration page opens.

6. Click **New stream** and select **Wowza Streaming Cloud**. The new stream is created using the default name Stream 1
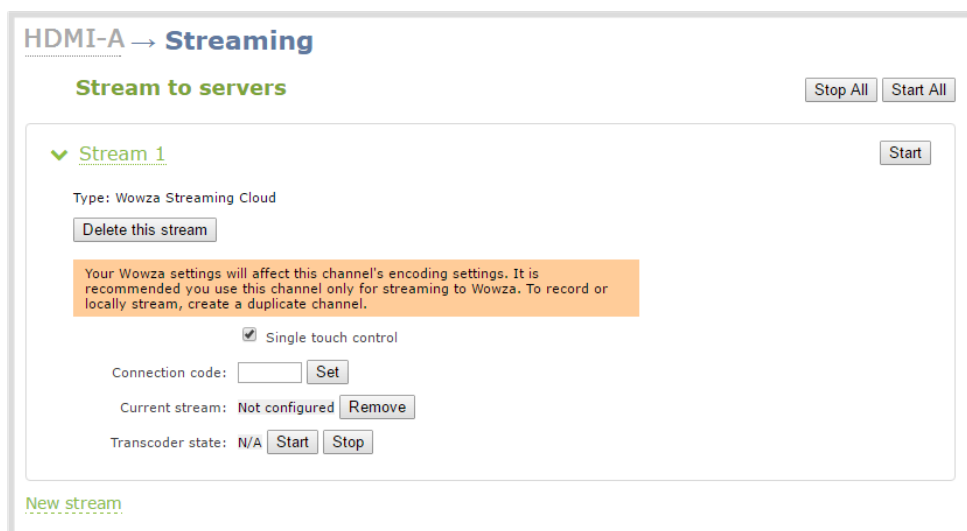
7. Enter the **Connection code** from the Wowza Streaming Cloud set-up.
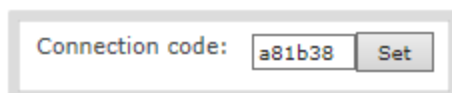
8. Click **Set** to pair the channel on Epiphan's encoder with the live stream on Wowza Cloud. Once validated, the stream name you configured in the Wowza Cloud appears.

9. To start streaming, do the following:

a. Click **Start** Transcoder state. If you log into your stream on Wowza Cloud, you'll see the stream is started but no video is detected. Alternatively, you can start the transcoder using the Wowza Cloud interface, by clicking **Start Stream**.

This action starts your session charges with Wowza Cloud.

b. To start sending video to the Wowza Cloud, click **Start** on the Streaming page to start the individual stream or **Start all** to simultaneously start this stream and any other streams you have configured for this channel.

10. When the connection to Wowza Cloud has been established, the stream name appears on the channel's **Status** page.

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Connections

Stream name	Client IP	Bitrate	Bytes transmitted
Publish	Wowza Streaming Cloud: Documentation Live Stream	6701 kbps	76128 KBytes

> After clicking either Transcoder or Publish **Start** buttons, there can be a short delay before the stream is established.

See Start and stop streaming to a CDN for instructions to start streaming from the touch screen or see Control streaming and recording for instructions to use Epiphan Live.

Stop streaming to the Wowza Streaming Cloud

When you are done streaming, be sure to stop the Wowza Transcoder by either returning to the channel's streaming page and pressing the **Stop** Transcoder button, or by logging into the Wowza Cloud and stopping the stream. Charges from Wowza continue until the Wowza Cloud stream is stopped in one of these two ways.

> Stopping the stream by using the touch screen , pressing **Stop** or by the Epiphan Live Publish button does not stop the charges applied by Wowza.

Stream to Original Livestream

To set up streaming via the Original Livestream service, you first need to sign in to your Original Livestream account and create a new stream.

To setup streaming to the original Livestream:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

3. From the Channels menu, select a channel and click **Encoding**. The channel's Encoding page opens.

4. Set the **Codec** to H.264, the **Resolution** to 640x480, the **Frame rate** to 30 fps, the **Bitrate** to 4 kbps, and the audio to 64 kbps AAC.

> Configuring audio is optional. Supported formats are limited to MP3 and AAC. Due to RTMP restrictions, MP3 48 kHz is not supported.

5. Click **Apply**.

6. Click **Streaming** for the channel. The Streaming configuration page opens.

7. Click New stream and select **Original Livestream**.
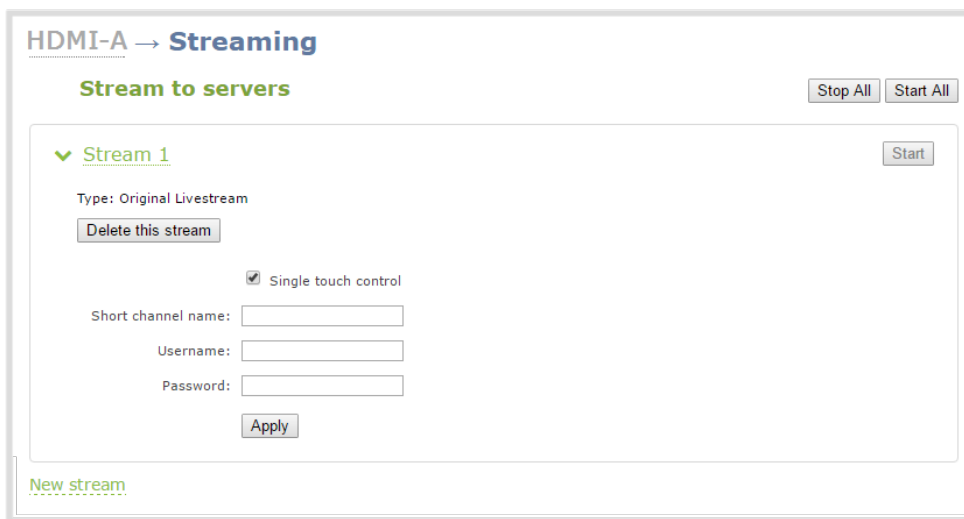
8. Enter the channel name in the **Short channel name** field.

9. Enter your Original Livestream **Username** and **Password** , then click **Apply**.

10. Click **Start** to start that individual stream or **Start all** to simultaneously start this stream and any other streams you have configured for the channel.

> After clicking **Apply**, there may be a short 2-3 minute delay before the live stream is displayed.

When the connection to Original Livestream is established, the stream name appears on the channel's **Status** page.

See Start and stop streaming to a CDN for instructions to control streaming from the touch screen or see Control streaming and recording for instructions to use Epiphan Live.

Stream using multicast

A multicast stream consists of one stream distributed to many viewers via a multicast-capable network. You are only able to broadcast to one multicast network at a time, but you may broadcast to a multicast network and any number of non-multicast CDNs.

Pearl Mini supports multicast streaming content to an IP TV or a set-top box playlist when the stream format is MPEG-TS. You may only stream to one multicast network at a time.

> Note that only one multicast network may be used simultaneously. So if you select **MPEG-TS UDP push**, **MPEG-TS RTP/UDP push** or **RTP/UDP push**, you are not able to select any of the others, and you must delete the stream to select a different multicast network. Adding, removing, or changing the settings for any of these three multicast publishers stops any current streaming or recording session.

Topics include:

- MPEG-TS streams using RTP/UDP push
- MPEG-TS streams using UDP push
- Multicast streaming using RTP/UDP
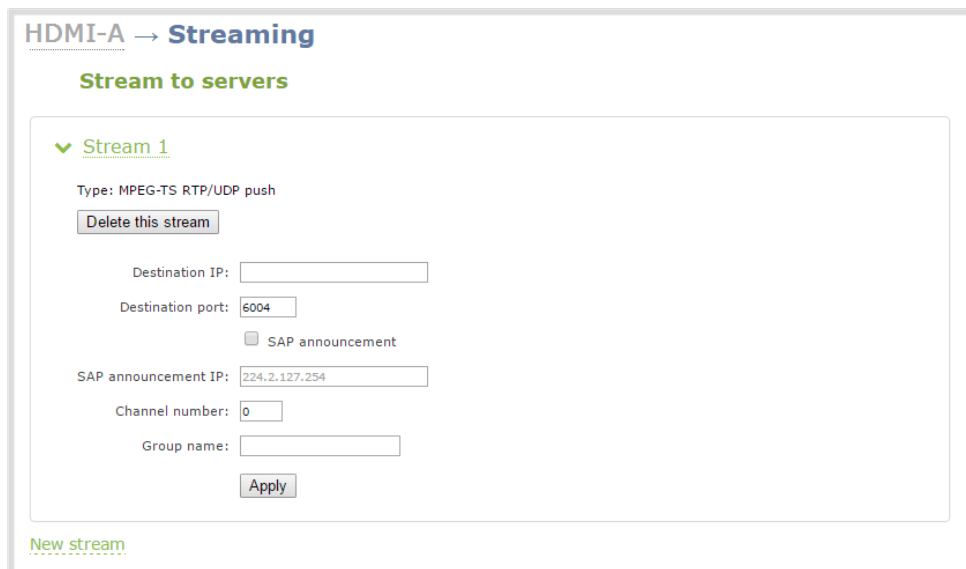
MPEG-TS streams using RTP/UDP push

Before configuring your channel for MPEG-TS streaming, ensure the following codecs are configured:

- Video – H.264
- Audio – MP3 or AAC, if audio is configured.

To configure your channel for MPEG-TS using RTP/UDP push:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Channels menu, select a channel and click **Streaming**. The Streaming configuration page opens.
3. Click **New stream** and select **MPEG-TS RTP/UDP push**.

4. Enter the destination multicast IP address where the broadcast can be viewed.

> A IPv4 multicast address range is an address between 224.0.0.0 to 239.255.255.255. Contact your System Administrator for the specific address to use.

5. Enter the destination port number through which the media will stream.

6. (Optional) To advertise your stream to a media player over a local network, do the following:

   a. Check **SAP announcement** to enable advertising your stream over a local network. When this is enabled and a multicast IP address is configured, your stream is displayed in the playlist of the local media player.

   b. Enter a multicast IP address in the **SAP announcement IP** field. If your media player is configured to receive multicast streams from an IP address that is different from the default address 224.2.127.254, you may need to contact your system administrator for a specific multicast IP address.

   c. Enter a channel number in the **Channel number** field to identify your stream in the media player. By default, the Channel number is the channel identifier.

   > When a channel number value is not specified, viewers cannot select a channel from the set-top box or Smart TV .

   d. Enter a name for a group of streams in the text box next to **Group name**. Since media players simply present a list of available streams, you can organize your streams into multiple folders or

in cases where folders are not displayed, use dot separator hierarchy to help your viewers filter out unwanted streams by category.

7. Click **Apply**.

8. Click the **Info** menu option of the Admin panel. An Info page opens displaying stream information.

To view the stream from a media player, open the URL in a media player, for example:

> rtp://@ip:port or in the case of the sample configuration in the figure shown above:
>
> rtp://@226.10.24.32:7000

To view the stream when SAP announce has been set and the stream is advertised on a media player, set-top-box or Smart TV, refer to Viewing with Session Announcement Protocol (SAP).

MPEG-TS streams using UDP push

Before configuring your channel for MPEG-TS streaming, ensure the following codecs are configured in the encoding section:

- Video – H.264

- Audio – MP3 or AAC, if audio is configured.

To configure MPEG-TS with UDP push:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

3. From the Channels menu, select a channel and click **Streaming**. The Streaming configuration page opens.

4. Click **New stream** and select **MPEG-TS UDP push**.

5. Enter the destination multicast IP address where the broadcast can be viewed.

> A IPv4 multicast address range is an address between 224.0.0.0 to 239.255.255.255.
> Contact your System Administrator for the specific address to use.

6. Enter the destination port number through which the media will stream.

7. (Optional) To advertise your stream to a media player over a local network, do the following:

    a. Check **SAP announcement** to enable advertising your stream over a local network. When this is enabled and a multicast IP address is configured, your stream is displayed in the playlist of the local media player.

    b. Enter a multicast IP address in the **SAP announcement IP** field. If your media player is configured to receive multicast streams from an IP address that is different from the default address 224.2.127.254, you may need to contact your system administrator for a specific multicast IP address.

    c. Enter a channel number in the **Channel number** field to identify your stream in the media player. By default, the Channel number is the channel identifier.

    > When a channel number value is not specified, viewers cannot select a channel from the set-top box or Smart TV .

    d. Enter a name for a group of streams in the text box next to **Group name**. Since media players simply present a list of available streams, you can organize your streams into multiple folders or

in cases where folders are not displayed, use dot separator hierarchy to help your viewers filter out unwanted streams by category.

8. Click **Apply**.

To view the stream, open the URL in a media player, for example:
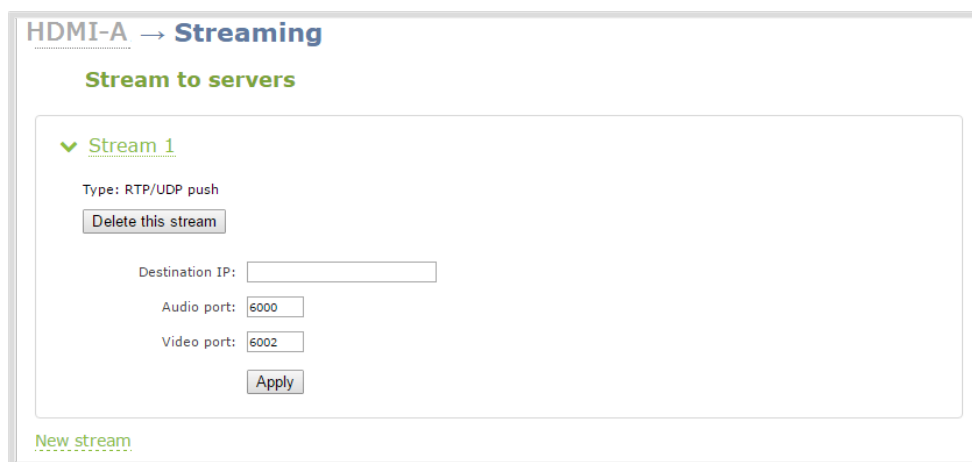
> udp://@ip:port
>
> **For example:** udp://@226.10.24.32:7000

To view the stream when SAP announce has been set and the stream is advertised from a media player, set-top-box or Smart TV, refer to Viewing with Session Announcement Protocol (SAP).

Multicast streaming using RTP/UDP

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

3. From the Channels menu, select a channel and click **Streaming**. The Streaming configuration page opens.

4. Click **New stream** and select **RTP/UDP push**.

5. Enter the following:

- Destination multicast IP address.
- Audio port number through which the audio will stream.
- Video port number through which the video will stream.

> ✅ Audio and video use nearby port numbers (<port number>and <port number+2>). The minimum distance between audio and video ports must be 2.

6. Click **Apply**. An SDP file is generated.

7. From the channel's **Status** page, click the SDP file to download it. Provide the SDP file name and location if prompted.

8. Share the file with your viewers!

Viewing with Session Announcement Protocol (SAP)

When SAP Announce is configured for a stream that uses UDP streaming, the stream is advertised over the local network. Local viewers can view the stream using a software or hardware media player. Viewers are presented with a list of available channels, similar to a television menu. Viewers need only click on a stream and the video is streamed to their desktop, mobile or tablet. To configure SAP announce, go to Stream using multicast.

Your stream is advertised by the metadata title, if one was configured under Branding, otherwise it is identified by its channel identifier. For a description of how to set the metadata, refer to Add or remove channel metadata.

When browsing from a VLC media player, streams are advertised by their channel identifier and are organized by the group name. When browsing from an XBMC media player, streams are advertised by the stream's metadata title (if configured), otherwise streams are advertised by their channel identifier.

1. Ensure the stream has SAP announcement enabled, otherwise, it is not advertised in the media player's playlist.

2. Ensure the SAP announcement IP is a multicast IP address.

> ✅ Some media players, for example Exterity receivers, listen for SAP announcements on a specific multicast address 239.255.255.255. If your audience is using Exterity to view your stream, you must change the SAP announcement IP address to 239.255.255.255.

4. Launch a media player and play the streams.

   a. Using VLC, click **View** and select Playlist. The right-hand panel indicates the playlist is empty.

   b. From the side menu, click **Network streams (SAP)**. The playlist is populated with all streams in your network that are SAP announcement enabled. If you specified a Group Name when you configured the publish stream the stream will be listed in folder identified by the group name.

   c. Click on a live stream in the playlist to play the stream.

This VLC example shows two streams D2P83658.vga and D2P83658.video, which are organized in a folder by their group name.
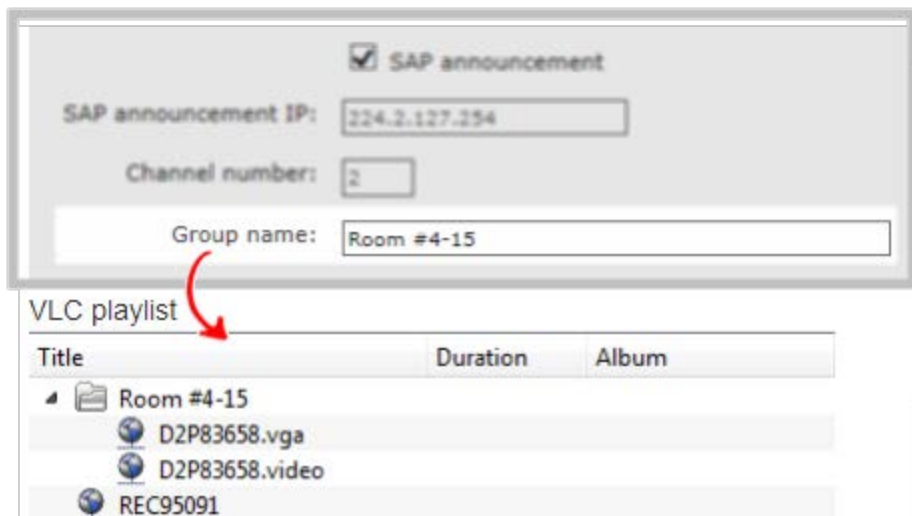
Stream to a media player or smart TV

Your Pearl Mini can use UPnP and SAP to stream to set top boxes, digital signs, smart TVs and other digital media players.

The following table gives an overview of each option.

Publishing Options	Use this option to...
UPnP	Using the Universal Plug and Play (UPnP) networking protocol, your Pearl Mini can be discovered and can stream to software and hardware media players, set-top-boxes and Smart TVs with ease.
SAP	Viewing with Session Announcement Protocol (SAP)SAP (session announcement protocol) is a protocol for broadcasting multicast session information. Media players can see the announcement or can use the multicast SDP file (session description file) directly.

> To stream video outside of your LAN, use a CDN or configure port forwarding on your router. Refer to your Network Administrator; network configuration is beyond the scope of this guide.

Stream using UPnP

Using the Universal Plug and Play (UPnP) networking protocol, your Pearl Mini can be discovered and can stream to software and hardware media players, set-top-boxes and Smart TVs with ease. If UPnP is enabled, the system automatically establishes communication with media players on the network.

UPnP uses MPEG-TS over HTTP with the H.264 codec and MP3 or AAC audio encoding (or no audio). You can only access live streams or recordings that meet these requirements.

For security reasons, UPnP access to live streams and recorded files is disabled by default.

> Some players can not access the stream or saved recordings if a viewer password is set. See **User administration** to remove the viewer password if set.

Topics include:

- Enable UPnP
- Disable UPnP
- Viewing with UPnP

- Play directly to a media player
- Auto-restart playback to a UPnP device
- Change UPnP device name

To choose recordings or live streams from your media player, see Play directly to a media player.

Enable UPnP

For security reasons, UPnP is disabled for Pearl Mini at the device level and for each channel by default. You can enable UPnP to allow digital media players on the network to browse for recorded media files or live streams on your Pearl Mini.

There are two steps to enable UPnP on Pearl Mini:

- Enable UPnP at the device level (including setting a share name)
- Enable UPnP for channels and recorders
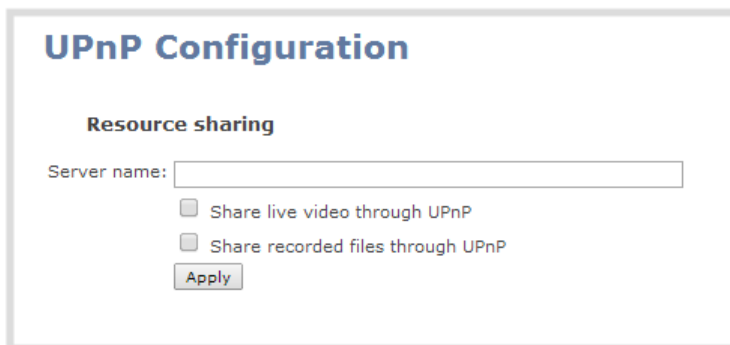
Streams and MPEG-TS recorded files must use the supported codecs: H.264 with MP3 or AAC audio. Having a viewer password could prevent the ability to use UPnP.

Enable UPnP for the device

To enable UPnP sharing for the device:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

3. From the Configuration menu, click **UPnP**. The UPnP configuration page opens.

4. Enter a name in the **Server name** field. If no name is provided the server name will be the serial number of Pearl Mini.

5. Select whether you want to share live video and recorded files and click **Apply**.

If no live stream is available that meets the criteria for UPnP, a message is displayed in the **Play on service start** section of the page.
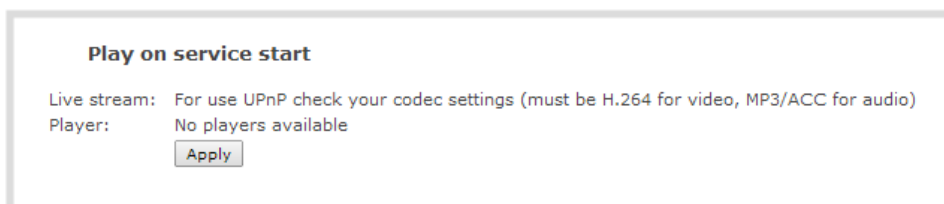
Otherwise, the Play on service start section shows a drop-down list of what can be streamed.
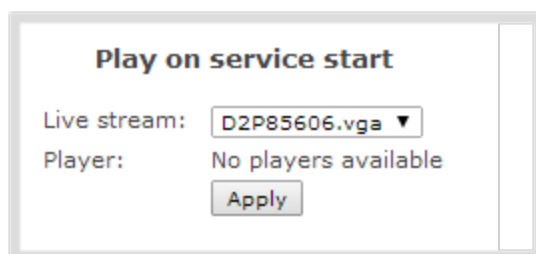
Enable UPnP for channels and recorders

After you enable UPnP for the device to allow live stream and recorded file sharing, you need to enable sharing for each channel and recorder you want to share.

To enable UPnP sharing for channels and recorders:

1. For channels (live streaming):

   a. Click **Streaming** for the channel. The Streaming configuration page opens.

   b. Check **Share via UPnP** and click **Apply**.
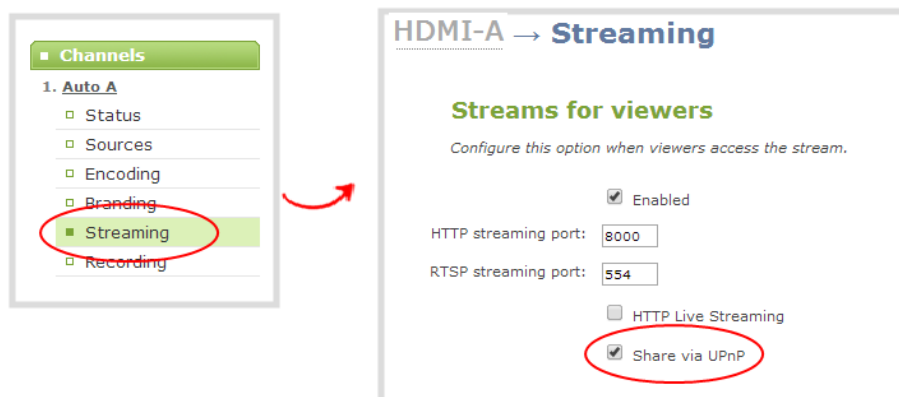
256

If you have not already enabled UPnP for the device, the message "UPnP live video sharing is not enabled with this device, to fix it, click here" appears. Click **to fix it click here**. The UPnP service will start when you click **Apply**.

2. For channels (recorded files):

a. Click **Recording** for a channel. The channel's recording page opens.

b. Click **change** under Recorder Setup. The recording setup options opens.
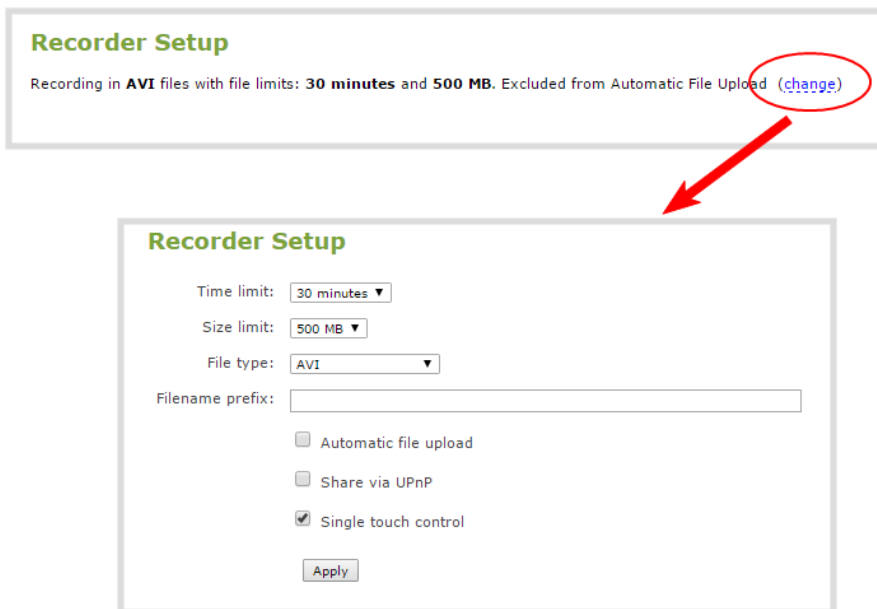
c. Check **Share via UPnP** and click **Apply**.

If you have not already enabled UPnP for the device, the message "UPnP live video sharing is not enabled with this device, to fix it, click here" appears. Click **to fix it click here**. The UPnP service will start when you click **Apply**.

3. For recorders:

a. Click **Recording** for a channel. The channel's recording page opens.

b. Click **change** under Recorder Setup. The recording setup options open.
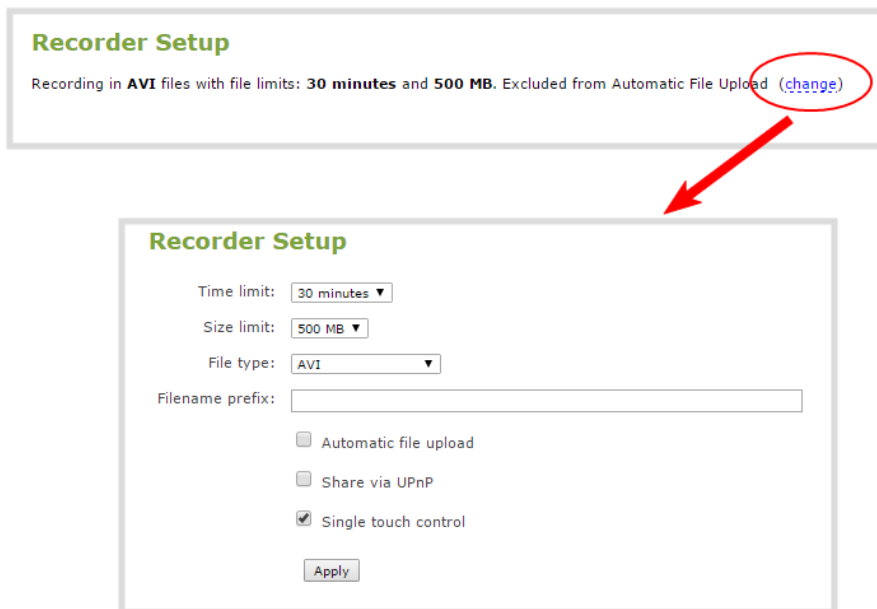
c. Check **Share via UPnP** and click **Apply**.

If you have not already enabled UPnP for the device, the message "UPnP live video sharing is not enabled with this device, to fix it, click here" appears. Click **to fix it click here**. The UPnP service will start when you click **Apply**.

You can now browse for your server from your digital media player.

Disable UPnP

By default, UPnP sharing is disable for the device, and for each channels and recorder. If you enabled UPnP sharing it for a particular broadcast, you may want to disable UPnP sharing after the broadcast is complete. You can choose to disable access to live streams, recorded files, or to the whole system.

To disable UPnP for a channel or recorder:

1. For channels:

    a. Click **Streaming** for the channel. The Streaming configuration page opens.

    b. Uncheck **Share via UPnP** and click **Apply**.

2. For recorders:

    a. From the Recorders menu, select a recorder.

    b. Click **change** under Recorder Setup. The recording setup options opens.

    c. Uncheck **Share via UPnP** and click **Apply**.
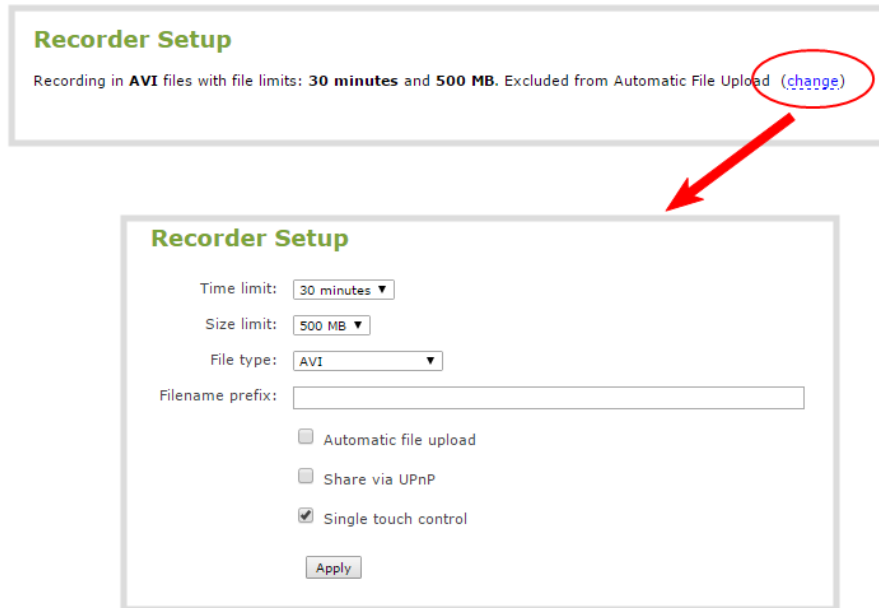
To disable UPnP globally for the device:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

3. From the Configuration menu, click **UPnP**. The UPnP configuration page opens.

4. Uncheck **Share live video through UPnP** to stop sharing live video.

5. Uncheck **Share recorded files through UPnP** to stop sharing recorded files.

6. Click **Apply**.

Viewing with UPnP

Using a software or hardware media player, you can browse for files or streams with Universal Plug and Play (UPnP). UPnP uses MPEG-TS over HTTP with the H.264 codec and MP3 or AAC audio encoding (or no audio). You can only access live streams or recordings that meet these requirements.

For security reasons, UPnP access to live streams and recorded files is disabled by default. To enable UPnP, see Enable UPnP

Some players cannot access the stream or saved recordings if a viewer password is set. If needed, see **Remove user passwords** to clear the viewer password.

When browsing via UPnP your Pearl Mini is displayed by the server name you set, or it's product serial number.

For example, when browsing from a Windows computer, you will see a list of media devices that includes Pearl Mini:
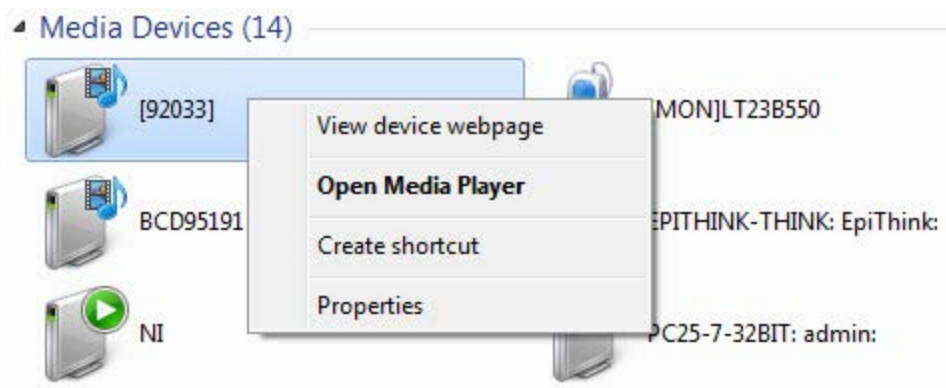
Live streams

When you open the device from Windows Media Player, you'll see a list of the available channels you can stream under the Videos tab. From other digital media players, the channel list can be under a **Live Streams** folder.

With Windows Media Player, double click to open any channel and press Play to start the stream. Using your digital media player, select a live stream and press play.

Recorded files

Recorded files are shown in the Recorded Files folder. Files are organized by the channel or recorder from which they were recorded. Windows Media Player shows the recorder files side by side with the channels and other digital media players show the recorded files in a file tree format, see below.
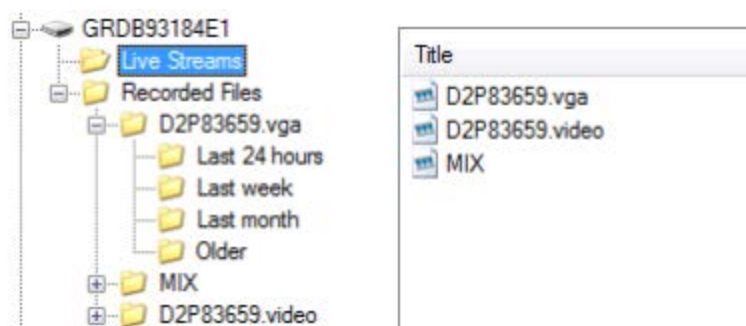
UPnP can also be used to directly play a recording to the digital media player, or to set a media player to automatically play a particular live stream after reboot of Pearl Mini. See Stream using UPnP and Play directly to a media player.

Play directly to a media player

If your digital media player is UPnP enabled, Pearl Mini can play direct the media player to play recorded files, without browsing through menus in the player.

Recorded files must be in MPEG-TS format and use the supported codecs: H.264 with MP3 or AAC audio.

If a viewer password is configured, that could prevent the ability to use UPnP, see Set or change user passwords.

To play directly to a media player:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. Ensure **Share recorded files through UPnP** is enabled on your Pearl Mini and for the channel or recorder you want to share, see Enable UPnP.

3. Open the recorded files list for the channel or recorder, see View list of recorded files.

4. From the list of files, select the file you want to play and click on the **Play To** icon for the file. A list of visible digital media players is displayed.

5. Select a media player. The recording plays on the screen that is connected to the media player.

Auto-restart playback to a UPnP device

In unmanned situations such as industrial applications and digital signs, it is useful to automatically have a stream played to a digital media player, even if Pearl Mini restarts.

To configure auto-restart of a stream to a media player:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

3. From the Configuration menu, click **UPnP**. The UPnP configuration page opens.

4. In the Play on service start section, select a stream from the **Live stream** drop-down list.

5. Select a digital media player from the **Player** drop-down list. Digital media players on your network that support UPnP playback appear automatically in the list.

6. Click **Apply**.

> Only a single stream and player combination can be configured for auto play. The channel's UPnP configuration must be enabled for it to appear.

Change UPnP device name

You can configure the UPnP server name that appears for your Pearl Mini. By default, if you left the server name field blank when enabling UPnP, the server name is the system's serial number.

To change the UPnP server name:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

3. From the Configuration menu, click **UPnP**. The UPnP configuration page opens.

4. Highlight and delete the text in the **Server name** field, if any.

5. Type a new server name. Use characters A-Z, a-z, 0-9, _, :, @, ^, #, -. {}, [], ().

6. Click **Apply**.

PART 4: Record

Pearl Mini encodes the video and audio it captures. You can stream your content and record it at the same time. You can even stream your switched program using a lower quality stream (i.e. 1280×720 @ 2Mbps) and at the same time make a high quality recording of the second channel (i.e. 1920×1080 @ 4 Mbps).

There are different ways to download recordings, like automatically downloading recordings to a USB memory device. For Pearl Mini, an SD card must be installed to record content using Pearl Mini, see SD card installation and file management.

Topics include:

- About recording
- Record a channel
- Record using One Touch control
- Configure recording file size and type
- Restart recording
- Recorders
- Manage recorded files
- File and recording transfer
- Local FTP server

About recording

You can record each of the channels on Pearl Mini as AVI, MOV, MPEG-TS, MP4, or MP4-Fragmented. You can also setup multi-track recorders, see Recorders.

Recording using Pearl Mini is robust. If an accidental system shutdown occurs while recording is in progress, your recordings are gracefully closed off so they are still playable.

Physically unplugging a video source from the input port or otherwise interrupting the signal does not stop recording. A No Signal image is inserted. When recording a multi-channel recorder or a multi-source layout channel, a new file is created if an additional source is added to the recorder.

Easily stop and start recording using any of the user interfaces:

- Admin panel
- Touch screen
- Epiphan Live

To learn how to use Epiphan Live to control recording, see Control streaming and recording.

Using the One Touch feature, you can control recording of all your channels and recorders with a single tap on the touch screen, see About One Touch streaming and recording.

Pearl Mini comes with APIs so you can setup third party tools to control recording, see Controlling Pearl Mini using HTTP commands and Controlling Pearl Mini using RS-232 / serial port.

Each channel or recorder has a maximum time or file size limit setting that you can configure using the Admin panel. The default recording limits are set to 30 minutes or 500 MB, whichever comes first. When the time or file size limit is reached, the current recording is saved and a new recording file starts automatically without losing any content.

An SD card must be installed to record, see SD card installation and file management.

Important considerations

- Ejecting the SD card while the recording is in progress may corrupt the SD card and cause loss of data. Power down Pearl Mini before ejecting the SD card. Stop all recordings before powering down the system.

- If you set the file size limit and then swap in a smaller SD card, you must change the file size limit to a smaller size using the Admin panel if the file size limit is bigger than the SD card.

- Recording with a file size limit that exceeds the size of the SD card will corrupt the SD card.

- If you create multiple recorders and start recording them at the same time, the SD card will be corrupted if the total of the file size limits for each recorder exceeds the size of the SD card.

- Newer recordings overwrite oldest recordings when the amount of free space on the SD card is less than the configured recording file size limit.

- The SD card is formatted for Ubuntu systems and is not compatible with Windows and Mac devices. To download recordings, see Manage recorded files.

Epiphan has tested recordings with the following players. See Troubleshooting Quick Reference for known player issues.

Table 48 Tested Media Players

Operating System	Tested Players
Mac OS	- QuickTime 10.3 - QuickTime 7.6.6+ - VLC 2.2.4 - Playback Pro 2.3.2 - Final Cut Pro 10.3.2 - Adobe Premiere Pro CC 2017
Windows	- QuickTime 7.6.6+ - VLC 2.2.6 - Windows Media player 12+ - Movies & TV (Windows 10) - Adobe Premiere Pro CC 2015
Linux	- MPlayer - VLC 2.2.2
HTML 5 Browsers (Windows)	Google Chrome 37+ (works with MOV and MP4 files using H.264 codec)

> Not all media players and editors support all recording formats, such as the more modern MP4-fragmented format. To playback MOV files created by Pearl Mini, we recommend using a newer media player.

Record a channel

Each channel has a configuration page in the Admin panel where you can start and stop recording, as well as configure recording settings for the channel.

You can also start and stop recording from the channel view using the touch screen on Pearl Mini (see Record a channel using the touch screen) and using Epiphan Live (see Control streaming and recording).

The channel number turns red to indicate it is recording. If the system runs out of storage space, the oldest recorded file is deleted to make room for the new recording.
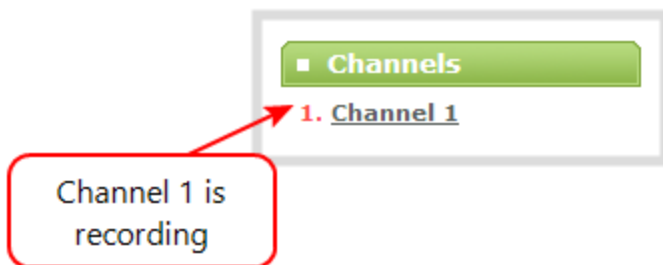
To start and stop channel recording using the Admin panel:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2. From the Channels menu, select the channel and click **Recording**. The channel recording menu opens.
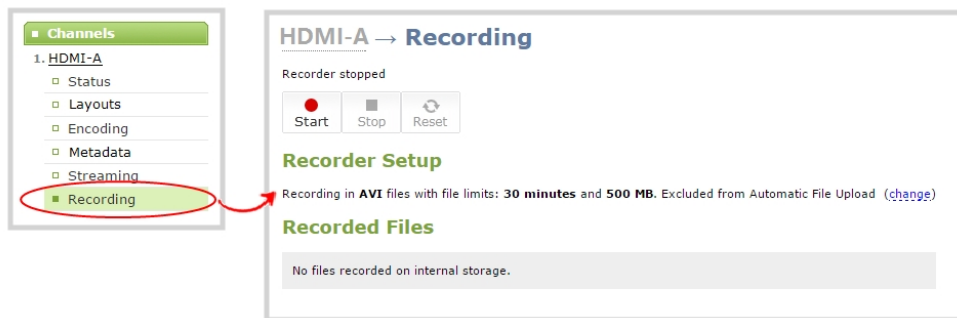
3.　Click **Start** to start recording the channel and click **Stop** to stop recording.

> **Recorder stopped**
>
> ● **Start**　■ Stop　↻ Reset
>
> ## Recorder Setup
>
> Recording in **AVI** files with file limits: **30 minutes** and **500 MB** (change)
>
> ## Recorded Files
>
> No files recorded on internal storage.
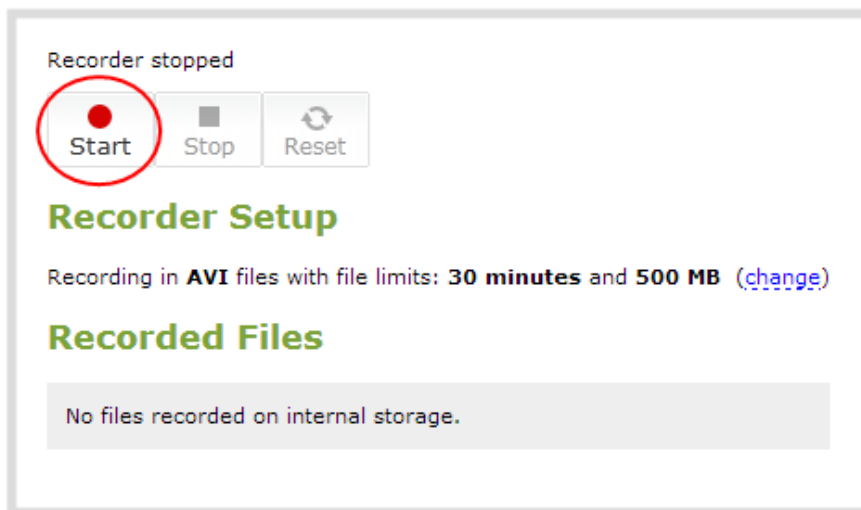
> 🛑 If the Start button is not active, there are no active sources for this channel or recorder. Check your inputs to ensure signals are working as expected.

You can navigate away from the recording page without affecting the recording.

Record using One Touch control

Pearl Mini's One Touch recording and streaming control allows you to control your recording and streaming across any number of channels and recorders with a single tap on the touch screen. Channels and recorders are enabled for One Touch recording by default. For more information, see One Touch streaming and recording control.

To control recording using One Touch control:

1.　Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2.　Configure your channels and recorders for One Touch control, see Specify channels and recorders for One Touch recording.

3.　Tap the **One Touch control** icon along the bottom of the touch screen to display the One Touch control screen.

> If the One Touch control icon is not visible on the touch screen, tap the screen once to activate the control icons. If the control icons are still not visible, they are disabled. See **Configure the touch screen**.

4. From the One Touch control screen, tap **Start** to begin recording and tap **Stop** to end recording.
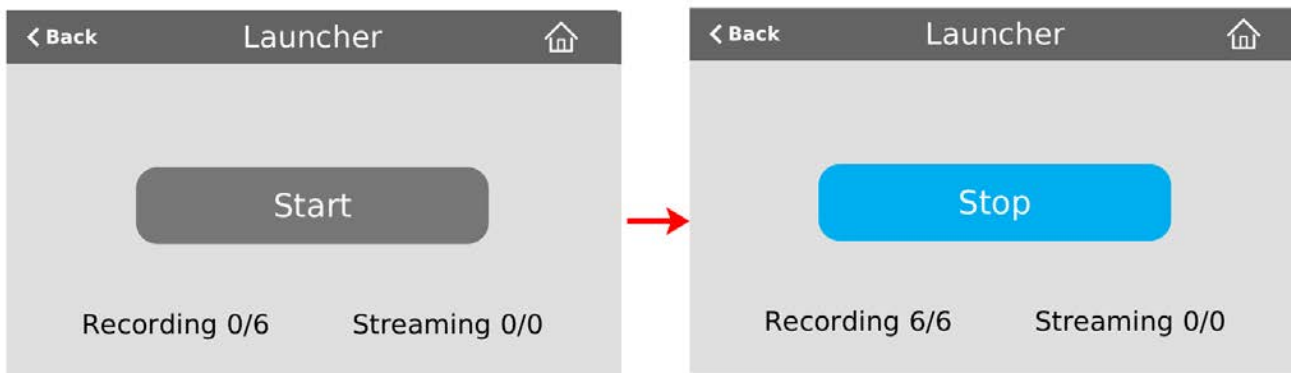
Configure recording settings, file size and type

Recordings are saved as AVI files by default. Each channel and recorder also has a file size limit set to 500 MB and the maximum file length set to 30 minutes by default.

When a recording reaches the file length of 30 minutes or 500 MB (whichever comes first), the system closes the current recording file and immediately opens a new one. No recorded data is lost.

> **Tip**: If you don't know what size to select, do some test recordings to get an idea of the file sizes you can expect. If you want to guarantee the recording lasts to a given time limit, select a file size that is far larger than you saw in your tests.

Important SD card considerations

- If you set the file size limit and then swap in a smaller SD card, you must change the file size limit to a smaller size using the Admin panel if the file size limit is bigger than the SD card.

- Recording with a file size limit that exceeds the size of the SD card will corrupt the SD card.

- If you create multiple recorders and start recording them at the same time, the SD card will be corrupted if the total of the file size limits for each recorder exceeds the size of the SD card.

- Newer recordings overwrite oldest recordings when the amount of free space on the SD card is less than the configured recording file size limit.

The following table describes the recordings configuration settings.

Table 49 Recordings Configuration Settings

Label	Description / Options
Time limit	Specifies the length of time the system waits before the recording file is saved and a new one is started (assuming the size limit has not yet been reached). Values range from 5 minutes to unlimited.
Size limit	Specifies the maximum file size a recording can reach before it is saved and a new recording is started (assuming the time limit has not yet been reached). Values depend on the size of SD card installed in Pearl Mini. The limit maximum is 64 GB.
File type	Specifies the recording file type. Select from AVI, MP4, MP4-Fragmented, MPEG-TS, or MOV. Choose MPEG-TS for UPnP playback. • **AVI**: Generally used for playback on Windows. • **MP4**: A progressive version of MP4. Select MP4 for the best compatibility with most video players and editors. Progressive MP4 files are initially recorded as MP4-Fragmented and are converted when the recording ends. > If power is lost while recording is in progress or during conversion, the files remain in fragmented MP4 format. You can run the file through **ffmpeg** or another transcoder to convert to the progressive format.

Label	Description / Options
	• **MP4-Fragmented**: A newer MP4 format. Fixed 10 second intervals. Select MP4-Fragmented for the same file format as releases 3.15.x. Some applications, like Adobe Premiere Pro, don't yet support fragmented MP4.
	There's no way to tell the difference between MP4 files and MP4-Fragmented files from the file name because both use the .mp4 extension.
	• **MPEG-TS**: Choose for UPnP playback. Does not support PCM audio encoding.
	• **MOV**: A progressive version of MOV. Generally used for playback on Mac OS. This type of MOV has the best compatibility with video players and editors.
Filename prefix	Specifies how the recordings are named. Recording files start with the given prefix followed by the date and time. The channel or recorder name is used if no prefix is given. Allowed characters: A-Z, a-z, 0-9, _, , #, -, [], ().

Avoid using spaces in recording file names. Use underscores or hyphens to separate words instead.

Note that the suffix is the date and time of the recording, which is set by the system. |
Automatic file upload	Select this if you want this channel or recorder to be part of any scheduled automatic uploads. See File and recording transfer for information on automatic uploads.
Share via UPnP	Select this if you want this channel or recorder to be available via UPnP. If global UPnP is not enabled when you select this option, a link appears to let you to fix it.
Single-touch control	Record using One Touch control

To change the recording configuration:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. Do one of the following:

    a. For a channel, click **Recording** from the Channels menu. The Recording page opens.

    b. For a recorder, select a recorder from the Recorders menu. The Recorder configuration page opens.

3. Click **change** under Recorder Setup. The recorder settings open.

4. Change the default recording file settings.

    • **Time limit**: Select a value from 5 minutes to unlimited.

- **Size limit**: Select a value from 50 MB to 4 GB.

- **File type**: AVI, MPEG-TS, MOV, MP4, or MP4-Fragmented.

5. (Optional) Enter a prefix for the recordings. All new recorded files for this channel or recorder will be prefixed using the text you enter.

6. (Optional) Click the check box to exclude this channel or recorder from automatic file uploads, see File and recording transfer.

7. Click **Apply**.

Restart recording

Recordings are automatically saved to a file and a new recording is started when:

- The recording reaches the configured time or size limit.

- The channel or recorder name is changed.

- Changes are made to the stream.

You can manually force a recording that's in progress to save to a file and continue recording in a new file from that point forward without any loss of content.

This is useful if you need to download a recording since you cannot download recordings that are in progress.

To restart recording to a new file:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. Do one of the following:

   a. For a channel, click **Recording** from the Channels menu. The Recording page opens.

   b. For a recorder, click the recorder from the Recorders menu. The Recording page opens.
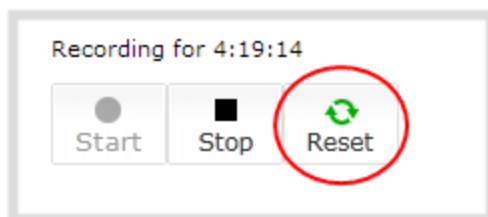
3. Click **Reset** to stop the current recording and start a new recording.

4. Refresh the page to see the updated list of recordings.

Recorders

Using recorders with Pearl Mini, you can record multiple channels together in a single multi-track file.

Recording multiple channels at the same time ensures that all your recordings start and stop at the same time. After recording stops, you can automatically use one of the system's file synchronization methods to copy the recordings off the server, or you can use our built-in tool to split the file into individual tracks for post-processing.

For important considerations about file size limits when creating multiple recorders, see Configure recording settings, file size and type.

> You only need to create recorders for multi-track recordings. For single channel recordings, see **Record a channel**.

Topics include:

- Add a recorder
- Select channels to record
- Rename a recorder
- Duplicate a recorder
- Delete a recorder

To change recording settings, such as the file size limit, type, or to add a custom prefix to the file name, see Configure recording settings, file size and type.

Add a recorder

Each channel has its own built-in recorder which you access from the channel's Recording page. However, if you want to record several channels simultaneously to a multi-track file, you need to add a recorder to Pearl Mini using the Admin panel.

Each new recorder is automatically assigned a number, for example: Recorder 1, Recorder 2, etc. and is set to record all configured channels by default.

For important considerations about file size limits when creating multiple recorders, see Configure recording settings, file size and type.

To add a recorder:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Recorders menu, click **Add recorder**.

Select channels to record

When you create a new recorder, it records all the channels configured on Pearl Mini in the single multi-track file by default. If you create new channels, they are automatically added to the recorder. You can choose which channels the recorder includes in the multi-track file using the Admin panel.

To change the channels recorded by a recorder:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Recorders menu, select a recorder. The recorder configuration page opens.

3. Click **change** next to the list of channels to record.

4. Check the boxes next to the channels you want to include, and click **Apply**.

> Channels with no active video source are displayed in italics. You can include these channels in your channel selections for the recorder.

Start and stop a recorder

You can start and stop recorders from the recorder's configuration page using the Admin panel.

You can also start and stop recorders using the One Touch control feature (see Record using One Touch control) and using Epiphan Live (see Record a channel using the touch screen).

The recorder number turns red to indicate it is recording. If the system runs out of storage space, the oldest recorded file is deleted to make room for the new recording.
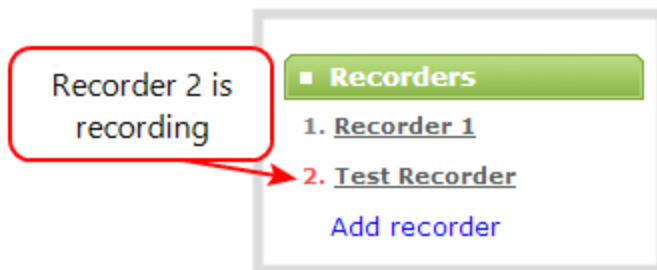
You can have multiple recorders and multiple channels recording all at the same time. The number of channels being recorded is shown below the Start and Stop buttons on the recorder's configuration page. To select which channels to include in the recorder, see Select channels to record.

To start and stop a recorder using the Admin panel:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2. From the Recorders menu, select a recorder. The recorder configuration page opens.

3. Click **Start** to begin recording and click **Stop** to end recording.
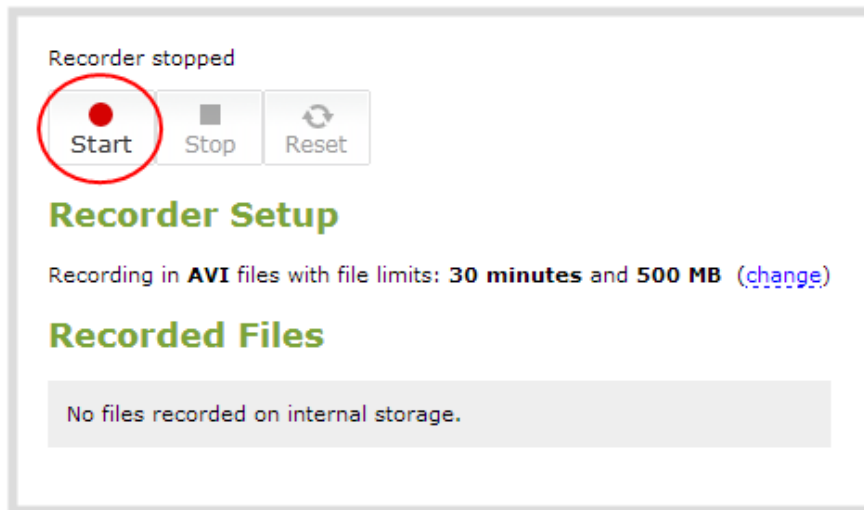
You can navigate away from the page without affecting the recording.

Rename a recorder

To rename a recorder:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Recorders menu, select a recorder. The recorder configuration page opens.

3. Click the recorder name and type the new name for the recorder.
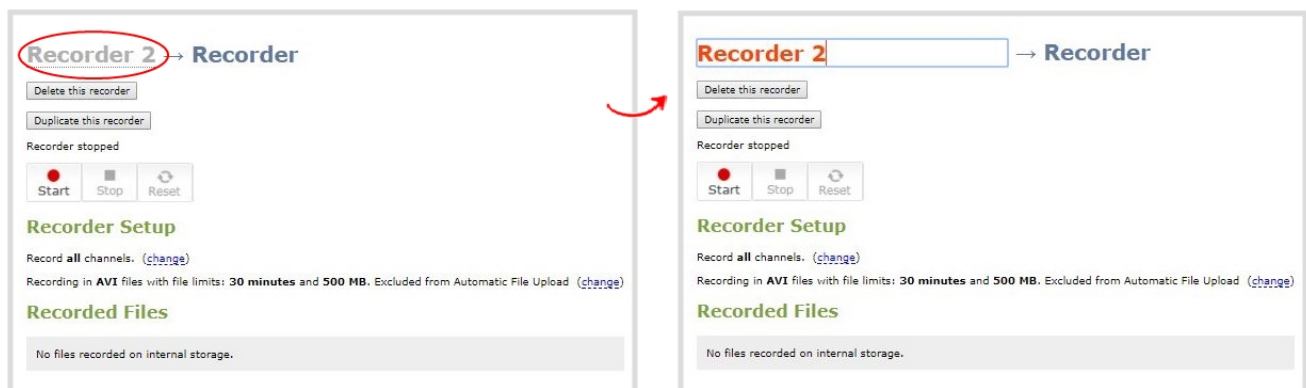
4. Press **Enter** to save the new name.

> You must press Enter to save the recorder name change.

Duplicate a recorder

You can duplicate any recorder you've created. All settings in the recorder you duplicate are recreated.

To duplicate a recorder:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Recorders menu, select a recorder. The recorder configuration page opens.

3. Click **Duplicate this recorder** . The duplicate recorder is created and assigned the next recorder number in your list of recorders.

Delete a recorder

When you no longer need a recorder, you can delete it.

> 🛑 Deleting a recorder deletes all the recorded files for the recorder. Be sure you have a copy of any important recorded files before proceeding.

To delete a recorder:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Recorders menu, select a recorder. The recorder configuration page opens.

3. Click **Delete this recorder** and click **OK** when prompted.

Manage recorded files

Recordings are saved to the SD card by default. When the SD card is full, new recordings overwrite the oldest recordings. You can not manually transfer recordings off the SD card to iOS or Windows systems.

There are a variety of ways to automatically transfer files from the system to local network storage. You can also manually select individual recordings to transfer or delete using the Admin panel.

Topics include:

- View list of recorded files

- Download recorded files manually

- Join recorded files together

- Extract tracks from a recording

- Rename recorded files

- Delete recorded files

For information about automatic file transfers, see File and recording transfer.
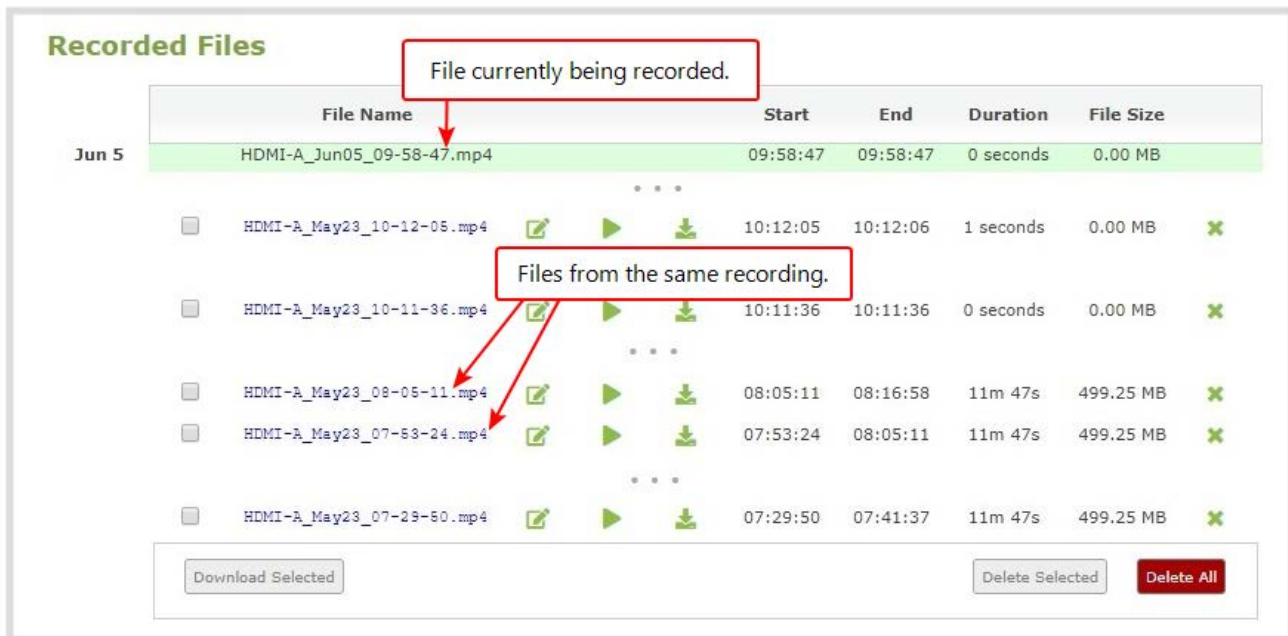
View list of recorded files

Recordings for Pearl Mini are stored for each channel and each recorder separately. You can view all the recordings for a channel or recorder using the Admin panel. You can also view the list of recordings using Epiphan Live in the section called Your recordings.

To view the recordings for a channels or recorders using the Admin panel:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2. Do one of the following:

    a. To view files recorded for a channel, select a channel from the Channels menu and click **Recording**. The Recording page opens.

    b. To view files recoded for a recorder, select a recorder from the Recorders menu. The Recorder page opens.

3. All recordings are listed and sorted by date.

Files that are part of the same recording session are listed one after another. Three dots appear between files of different recording sessions. The file currently being recorded (if applicable) is shown at the top of the list. It cannot be modified or downloaded until it has finished recording.

4. If there are no recordings, a message indicates there are no recorded files for this channel or recorder.
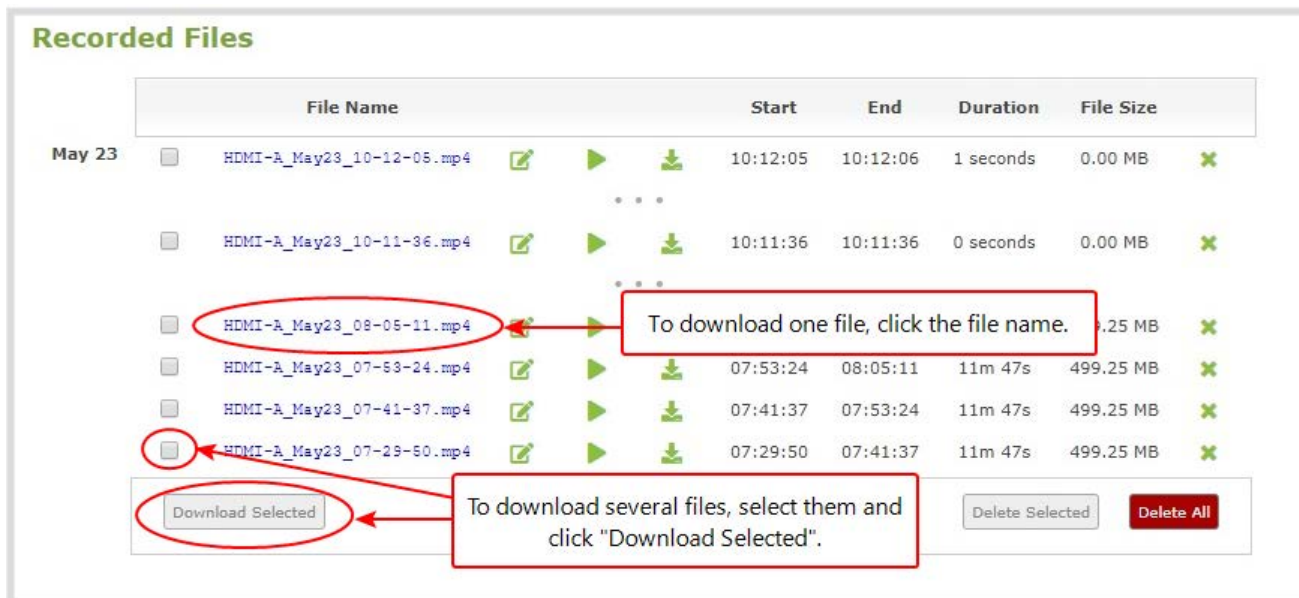
Download recorded files manually

You can manually download recordings using the Admin panel. Files you download are saved to your connected admin computer.

To free up space for new recordings, consider deleting recordings off of Pearl Mini, see Delete recorded files.

To download recordings to your admin computer:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2. Find the recordings by channel or by recorder. See View list of recorded files.

3. To download an individual file:

    a. Click the name of a recording file to download it.

4. To download multiple files:

    a. Select the check box next to the recordings you wish to download from this channel or recorder.

    b. Click **Download Selected** to download a zip file containing the selected recordings.

Join recorded files together

After recording files on Pearl Mini, you can join two or more files together. This is useful when a recording exceeds the maximum recording time limit and the recording is split in to multiple files. You can use the third-party tool called ffmpeg to join the files.

Download ffmpeg from the Internet (if necessary) to join recorded files:

1. Download the files that you need from Pearl Mini and make sure you have the right paths and file names. For example:

   > *C:\Users\JoesComputer\downloads\Program_A_May11_16-24-56.avi*

2. Use the command **ffmpeg -i** to specify the input file. For example:

   > *ffmpeg -i C:\Users\JoesComputer\downloads\Program_A_May11_16-24-56.avi*

3. Repeat the process and specify the file you want to join to the first file. You can keep adding as many files as you want to join together. For example, specifying a second file looks like this:

> *ffmpeg -i C:\Users\JoesComputer\downloads\Program_A_May11_16-24-56.avi -i*
> *C:\Users\JoesComputer\downloads\Program_A_May11_12-26-14.avi*

4. Use the **-c copy** command to specify the output file. After the command, type in the location, file name and file extension that you want for the concatenated file. The full line looks like this:

> **ffmpeg -i** C:\Users\JoesComputer\downloads\Program_A_May11_16-24-56.avi **-i**
> C:\Users\JoesComputer\downloads\Program_A_May11_12-26-14.avi **-c copy**
> C:\Users\JoesComputer\Desktop\Concatenated_File.avi

5. After completing the process, you will be able to access your new file in the location you specified. The file moves straight from the first video into the second without a pause.

> **STOP** You can this process to join multiple files; however, the more files you join, the greater the chance that some audio desychronization can occur between the clips.

Extract tracks from a recording

Recorders combine multiple channels and audio sources together in a single multi-track file. You can create a copy of a recording using only select tracks. This feature is supported for .AVI, .MP4 and .MOV recordings only. MPEG-TS does not support track extraction.

Specific track versions of recorded files are not included in any automatic file transfers and need to be downloaded manually. Click the extracted track filename to manually download, see Download recorded files manually.

Ensure you have enough storage space for the extracted files before you start this procedure. To check how much storage space is available on the SD card, see Storage space and disk maintenance.

To create a duplicate recording file with only select tracks:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2. From the Recorders menu, select a recorder. The recorder page appears.

3. Click the multi-track icon beside the recording. A list of tracks appears.

4. Select the tracks you want to extract.

> **Tip**: To deselect all tracks, click the check box for the top track, then hold SHIFT and click the check box for the bottom track.

5. Click **Extract tracks**. A copy of the recording is created with only the selected tracks.

> Only one copy is saved per original recording. If you create a second copy, it will overwrite the previous one. Download the extracted copy of the recording with your chosen tracks to preserve it.

Rename recorded files

Recording files are named based on the file name prefix specified during configuration. You can change the recording file name using the Admin panel.

You can also change the default name that Pearl Mini assigns recordings, see Configure recording settings, file size and type for information about setting file name prefixes.

To rename recordings:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. Find the recordings by channel or by recorder. See View list of recorded files.

3. Select the edit icon next to the file name you wish to change.

4. Type the new file name and press **Enter** using your keyboard.

> The Admin panel keeps track of the filename extension (i.e. .avi) so you do not need to include it when renaming the file.

Delete recorded files

You can delete recordings using the Admin panel. You can delete one file at a time, select multiple files for a given recorder or channel and delete those, or you can delete all recordings for a channel or recorder.

> **STOP** Deleted recordings cannot be recovered.

To delete recordings:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2. Find the recordings by channel or by recorder. See View list of recorded files.

Recorded Files

	File Name				Start	End	Duration	File Size	
May 23	☐ HDMI-A_May23_10-12-05.mp4	📝	▶	⬇	10:12:05	10:12:06	1 seconds	0.00 MB	✖
			• • •						
	☐ HDMI-A_May23_10-11-36.mp4	📝	▶	⬇	10:11:36	10:11:36	0 seconds	0.00 MB	✖
			• • •						
	☐ HDMI-A_May23_08-05-11.mp4	📝	▶	⬇	08				
	☐ HDMI-A_May23_07-53-24.mp4	📝	▶	⬇	07:53:24	08:05:11	11m 47s	499.25 MB	✖
	☐ HDMI-A_May23_07-41-37.mp4	📝	▶	⬇	07:41:37	07:53:24	11m 47s	499.25 MB	✖
	☐ HDMI-A_May23_07-29-50.mp4	📝	▶	⬇	07:29:50	07:41:37	11m 47s	499.25 MB	✖

To delete all files, click "Delete All".

To delete files, select them and click "Delete Selected".

Download Selected   Delete Selected   **Delete All**

3. Do one of the following:

   a. To delete a single recording, click the X icon to the right of a recording and click **OK** when prompted.

   b. To delete multiple recordings, check the check box beside the recordings you want to delete and click **OK** when prompted.

   c. To delete all recordings for the selected channel or recorder, click **Delete Selected** and click **OK** when prompted.

> The list may not update immediately. You can refresh the list by reloading the Recording page (for channels) or the recorder settings page (for recorders).

File and recording transfer

Pearl Mini can be configured to automatically upload recordings from local storage to a network storage location or an attached USB drive. We call this Automatic File Upload or AFU for short.

Topics include:

- About Automatic File Upload (AFU)
- Configure AFU to FTP server parameters
- Choose files to include in AFU
- Enable and set timing for AFU
- Configure AFU to FTP server parameters
- Configure AFU to RSync server parameters
- Configure AFU to CIFS server parameters
- Configure AFU to SCP client parameters
- Configure AFU to SFTP server parameters
- Configure AFU to AWS S3 parameters
- Configure AFU to WebDav server parameters
- AFU or copy to USB

To view file upload logs and manage the AFU queue:

- View the AFU log
- View AFU status (via Pearl Mini's touch screen)
- Manage the AFU queue

About Automatic File Upload (AFU)

Pearl Mini can automatically upload recorded files from channels and recorders to an accessible off-system storage location.

Automatic File Upload (AFU) is not enabled by default. You must enable this feature for each channel or recorder that you want included in automatic file transfers. A log file of all file transfers is created that you can view anytime from the Admin panel.

The following types of off-system storage are supported for AFU:

- **FTP**

- **RSync**

- **CIFS**

- **SCP**

- **SFTP**

- **Amazon Web Server (AWS)**

- **WebDav**

- **USB Drive**

> Only **one** type of AFU can be used for all file transfers from the same channel or recorder.

After you enable AFU, you can set the file transfer to happen after a set amount of time or after the file completes recording.

Additional settings are available to help you manage your AFU recordings and avoid file name collisions at the AFU server side. You can:

- Automatically create a folder for your recorded files using the channel or recorder name.

- Save recordings to a folder that's labeled using the Pearl Mini serial number.

Files are automatically uploaded only once. New recordings created during later sessions do not overwrite files that were previously uploaded. A new file is uploaded.

If the connection is lost during the transfer, the transfer automatically restarts when the connection is reestablished.

If recorded files are selected for upload while the AFU is at maximum upload capacity or when the AFU is unavailable, they are added to an upload queue. Files and their relevant information are displayed in a list and are uploaded when the upload capacity becomes available.

Choose files to include in AFU

When configuring automatic file upload (AFU), you need to tell the system which channels and recorders you want included in the upload schedule.

If no channels or recorders are configured as a part of AFU, the following message appears in the Automatic File Upload configuration page.

To add a channel or recorder to your AFU schedule:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. Do one of the following:

   a. To add a channel, select the channel from the Channels menu and click **Recording**. The Recording page opens.

   b. To add a recorder, select the recorder from the Recorders menu. The recorder configuration page opens.

3. Click **change** under Recorder Setup. The recorder setup opens.

4. Check **Automatic file upload** and click **Apply**.

What's Next

After you've enabled AFU for your channels and recorders, enable AFU and configure the AFU settings for the location type (i.e. FTP, USB, AWS, etc).

Enable AFU and set parameters

After configuring the channels and recorders you want included in your Automatic File Upload (AFU) schedule, you must enable AFU and configure the frequency of file transfers.

The first transfer takes place when the configured frequency is reached. All recorded files that complete during that time period are included in the transfer. Currently recording files are not included in an AFU transfer until the recording has ended.

> Files saved before you complete automatic file upload configuration are not included as part of the automatic upload. You can manually transfer those files, see **Download recorded files manually**.

The following table describes the available AFU options.

Table 50 AFU Interval Options

Name	Description
On file rotation	The system uploads each file after it stops recording it. You can control file size and length to determine when files are done recording. You can also use the reset button to close the current file and open a new one. See Configure recording settings, file size and type.
Every hour	The system uploads completed recordings every hour.
Every 6 hours	The system uploads completed recordings every six hours.
Every 12 hours	The system uploads completed recordings every 12 hours.
Every 24 hours	The system uploads completed recordings every 24 hours.

To set up the frequency of automatic file uploads:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Automatic File Upload**. The Automatic File Upload configuration page opens.

Automatic File Upload

Enabled for: **Live Program**

☑ Enable Automatic File Upload

Protocol: External USB drive ▼

How often: On file rotation ▼

Remote path: [_____]

☐ Remove after upload

☐ Mark file as downloaded

☐ Create a subfolder for each channel

☐ Create a subfolder for device

Show log of automatic file upload

External USB drive

Apply

If your screen does not indicate that AFU is enabled for at least one channel or recorder, return to **Choose files to include in AFU**

3. Check **Enable Automatic File Upload**.

4. Select how often automatic updates take place.

5. (Optional) Enter the remote path. If no path is specified, the files are copied to the root folder of the destination file system.

If AFU to your server fails, check the server configuration and permissions.

---

6. (Optional) Set optional parameters:

- Check **Remove after upload** to have the files deleted from local storage on Pearl Mini when the upload completes.

- Check **Mark file as downloaded** to have the color of the file link in the recording list change to show the files are downloaded. This only applies if the files are not deleted after upload is complete.

- Check **Create a subfolder for each channel** to save the downloaded files in to a folder. Use either the channel or recorder name.

- Check **Create a subfolder for device** to save the downloaded files into a folder using the serial number of Pearl Mini.

7. Select the protocol transfer type, and then configure the protocol settings:

- Configure AFU to FTP server parameters

- Configure AFU to RSync server parameters

- Configure AFU to CIFS server parameters

- Configure AFU to SCP client parameters

- Configure AFU to SFTP server parameters

- Configure AFU to AWS S3 parameters

- Configure AFU to WebDav server parameters

- AFU or copy to USB

Configure AFU to FTP server parameters

You can automatically upload recordings to an FTP server when you select FTP as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure for AFU to an FTP server.

Table 51 *FTP Automatic Upload Configuration Parameters*
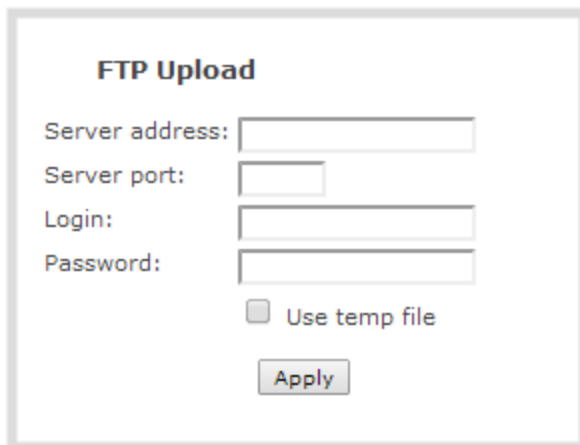
Name	Description
Server address	The IP address (or fully qualified domain name) of the FTP server.
Server port	The port used by the target FTP server. Standard port is 21.
Login	User name for the FTP server.
Password	Password for the FTP user.
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4 or .avi).

Prerequisites

- Channels and recorders are already added for AFU, see Choose files to include in AFU
- AFU is enabled and the parameters configured, see Enable AFU and set parameters.

To set the FTP server parameters for AFU:

1. From the Automatic File Upload configuration page, select **FTP Client** as the protocol transfer type.

2. Specify the target **Server address**. If your system is configured with DHCP or has a valid DNS configuration (see Configure DHCP), you can use the server's fully qualified domain name instead of the IP address.

3. Specify the **Server Port** used for the target FTP server. The standard port is 21.

4. Enter the FTP account username in the **Login** field.

5. Enter the FTP account password in the **Password** field. The characters are masked with dots.

6. Select **Use temp file** to name files with a temporary filename extension (.part) on the server until upload is complete.

7. Click **Apply**.

Configure AFU to RSync server parameters

You can automatically upload recordings to an RSync server when you select RSync as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure for AFU to an RSync server.

Table 52 *RSync Automatic File Upload Configuration Parameters*
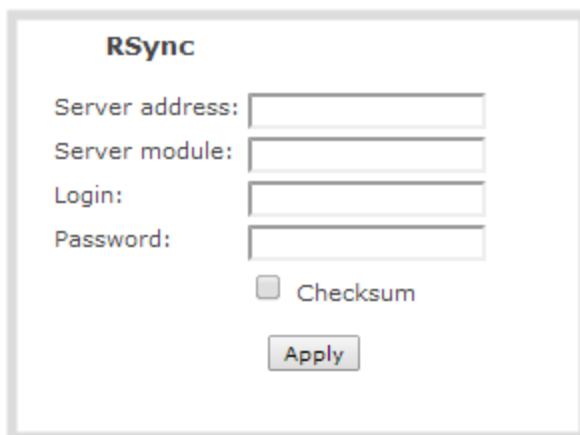
Name	Description
Server address	The IP address (or fully qualified domain name) of the RSync server.
Server module	The name of the shared folder on the RSync server.
Login	Username for the RSync server.
Password	Password for the RSync user.
Checksum	Select to enable checksum checking during file transfer. This increases the time taken to transfer, but also increases reliability of the transfer.

Prerequisites

- Channels and recorders are already added for AFU, see Choose files to include in AFU
- AFU is enabled and the parameters configured, see Enable AFU and set parameters.

To configure upload using RSync:

1. From the Automatic File Upload configuration page, select **RSync Client** as the protocol transfer type.

2. Specify the target **Server address**. If your system is configured with DHCP or has a valid DNS configuration (see Configure DHCP), you can use the server's fully qualified domain name instead of the IP address.

3. Specify the **Server module**. This is the name of the shared folder on the server. If needed, request this value from your network administrator.

4. Specify a username for the RSync Server in the **Login** field. The user must have write permissions for the module.

5. Specify the password for the user in the **Password** field; the value is masked by dots.

6. If desired, select the **Checksum** check box to add a checksum validation to the transfer between the system and the recipient server.

7. Click **Apply**.

Configure AFU to CIFS server parameters

You can automatically upload recordings to a CIFS server (also known as SMB or samba) when you select CIFS as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure AFU to a CIFS server.

Table 53 *CIFS Automatic File Upload Configuration Parameters*

Name	Description
Server Port	The CIFS server port. Leave blank to use the default port, or enter the port used for your CIFS server.
Server address	The IP address (or fully qualified domain name) of the CIFS server.
Server share	The name of the shared folder on the CIFS server.
Domain	The CIFS server's Windows domain or Work Group name . Needed if the server is part of Active Directory or a Domain Controller.
Login	Username for the CIFS server.
Password	Password for the CIFS user.
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4, .ts or .avi).

Prerequisites

- Channels and recorders are already added for AFU, see Choose files to include in AFU

- AFU is enabled and the parameters configured, see Enable AFU and set parameters.

To configure upload using CIFS:

1. From the Automatic File Upload configuration page, select **CIFS Client** as the protocol transfer type.

2. Specify the target **Server address**. If your system is configured with DHCP or has a valid DNS configuration (see Configure DHCP), you can use the server's fully qualified domain name instead of the IP address.

3. Enter the target **Server port**, if you have configured the server to use something non-standard. Leave this value blank to use the default port.

4. Specify the **Server share**. This is the CIFS share name or the name of the shared folder on the server. If needed, request this value from the network administrator.

5. If the system is in a different domain than the server or if it is part of Active Directory, enter the **Domain name** of the CIFS server.

6. Specify a username for the CIFS Server in the **Login** field. The user must have write permissions for the share folder.

7. Specify the password for the user in the **Password** field; the value is masked by dots.

8. Select **Use temp file** to name files with a temporary filename extension (.part) on the server until upload is complete.

9. Click **Apply**

Configure AFU to SCP client parameters

You can automatically upload recordings to an SCP (secure copy) client when you select SCP as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure AFU to an SCP client.

Table 54 *SCP Automatic Upload Configuration Parameters*
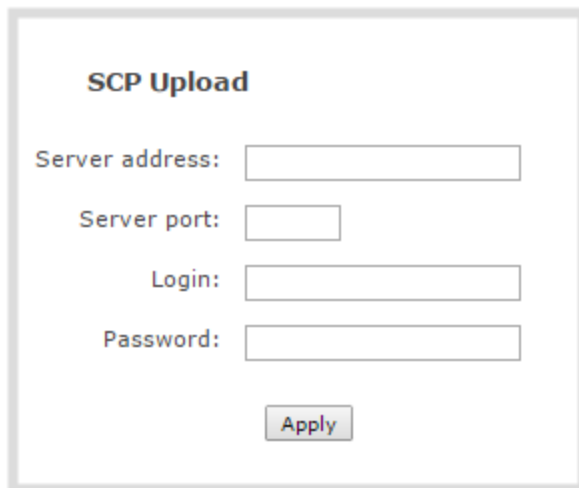
Name	Description
Server address	The IP address (or fully qualified domain name) of the destination server.
Server port	The SCP port used by the target server. Standard port is 22.
Login	Username for the SCP server.
Password	Password for the SCP user.

Prerequisites

- Channels and recorders are already added for AFU, see Choose files to include in AFU

- AFU is enabled and the parameters configured, see Enable AFU and set parameters.

To configure upload to an SCP client:

1. From the Automatic File Upload configuration page, select **SCP Client** as the protocol transfer type.

2. Specify the target **Server address**. If your system is configured with DHCP or has a valid DNS configuration (see Configure DHCP), you can use the server's fully qualified domain name instead of the IP address.

3. Specify the **Server Port** used for the destination SCP server. The standard port is 22.

4. Enter the SCP account username in the **Login** field.

5. Enter the SCP account password in the **Password** field; the characters are masked with dots. (Alternatively you can choose to use a private key instead of a password for authentication.)

> For secure copy you can upload an SSH identity for your Pearl Mini. This key must be trusted by the destination server. Details for generating the key and setting up this trust are beyond the scope of this document.

6. (Optional) Set up SSH identity for SCP and SFTP clients. If no identity is uploaded, or to upload a new identity (overwrites the old identity):

a. Click **Choose File** and navigate to select the private key file from your hard drive, then click **Open**.

b. Click **Upload** to upload the file.

> The system accepts RSA keys for SSH-1; DSA, ECDSA, EC25519 and RSA for SSH-2. Keys must be in **OpenSSH** format.

c. (Optional) Use the **Test your key** field to test your uploaded key against the secure server.

7. Click **Apply**

Configure AFU to SFTP server parameters

You can automatically upload recordings to a secure FTP (SFTP) server when you select SFTP as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure AFU to an SFTP server.

Table 55 *SFTP Automatic Upload Configuration Parameters*
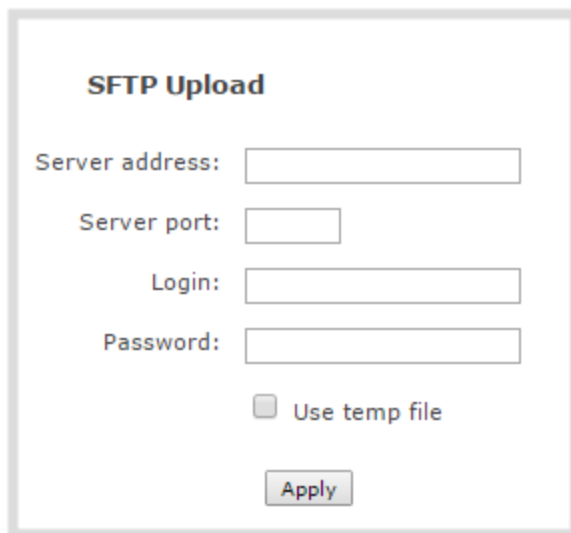
Name	Description
Server address	The IP address or fully qualified domain name of the SFTP server.
Server port	The port used by the target SFTP server. Standard port is 22.
Login	Username for the SFTP server.
Password	Password for the SFTP user.
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4 or .avi).

Prerequisites

- Channels and recorders are already added for AFU, see Choose files to include in AFU

- AFU is enabled and the parameters configured, see Enable AFU and set parameters.

To configure upload to an SFTP server:

1. From the Automatic File Upload configuration page, select **SFTP Client** as the protocol transfer type.

2. Specify the target **Server address**. If your system is configured with DHCP or has a valid DNS configuration (see Configure DHCP), you can use the server's fully qualified domain name instead of the IP address.

3. Specify the **Server Port** used for the target SFTP server. The standard port is 22.

4. Enter the SFTP account username in the **Login** field.

5. Enter the SFTP account password in the **Password** field. The characters are masked with dots. Alternatively, you can choose to use a private key instead of a password for authentication.

6. Select **Use temp file** to name files with a temporary filename extension (.part) on the server until upload is complete.

> For secure file transfer, you can upload an SSH identity for your Pearl Mini. This key must be trusted by the destination server. Details for generating the key and setting up this trust are beyond the scope of this document.

7. (Optional) Set up SSH identity for SCP and SFTP clients. If no identity is uploaded, or to upload a new identity (overwrites the old identity):

a. Click **Choose File** and navigate to select the private key file from your hard drive, then click **Open**.

b. Click **Upload** to upload the file.

> The system accepts RSA keys for SSH-1; DSA, ECDSA, EC25519 and RSA for SSH-2. Keys must be in **OpenSSH** format.

c. (Optional) Use the **Test your key** field to test your uploaded key against the secure server.

8. Click **Apply**

Configure AFU to AWS S3 parameters

You can automatically upload recordings to an Amazon Web Server (AWS) when you select AWS S3 as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure AFU to a bucket on Amazon Simple Storage Solution (S3).

Table 56 *AWS Automatic Upload Configuration Parameters*

Name	Description
AWS Region Code	The geographical region of the AWS server that contains the bucket you want to upload to, e.g. us-east-2.
Bucket	The id of the data storage container you created in Amazon S3 for the recorded live streaming files.
Access Key Id	The Access Key Id is part of your access key for your AWS account, i.e. GAKSOSIFDONN2EXAMPLE.
Secret Access Key	The secret access key is part of your access key for your AWS account, i.e.bHaprXUenFEMI/K6MANVG/cPxDfiBYEXAMPLEKEY.
Session Token	The temporary security token provided by the AWS Security Token Service (STS) that allows access to your AWS account for authorized users.

Prerequisites

- You must have read and write privileges for your AWS account to setup AFU to upload to an AWS S3 location

- Channels and recorders are already added for AFU, see Choose files to include in AFU

- AFU is enabled and the parameters configured, see Enable AFU and set parameters.

To configure upload to AWS S3:

1. From the Automatic File Upload configuration page, select **AWS S3 Client** as the protocol transfer type.

2. Specify the **AWS Region Code** and the data storage **Bucket** where you want to upload the file.

3. Enter your AWS **Access Key Id** and **Secret Access Key** to authenticate access to the AWS S3 data storage bucket.

4. In the **Session Token** field, enter the temporary token you got from the AWS Security Token Service (STS).

5. Click **Apply**.

Configure AFU to WebDav server parameters

You can automatically upload recordings to a WebDav server when you select WebDav as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure AFU to a WebDav server.

Table 57 *WebDav Automatic Upload Configuration Options*

Name	Description / Options
Server address	The IP address (or fully qualified domain name) of the FTP server.
Server port	The port used by the target WebDav server. Standard port is 21.
Login	Username for the WebDav server.
Password	Password for the WebDav user.
Enable HTTPS	Select if you need to use a secured HTTPS link to the WebDav server.
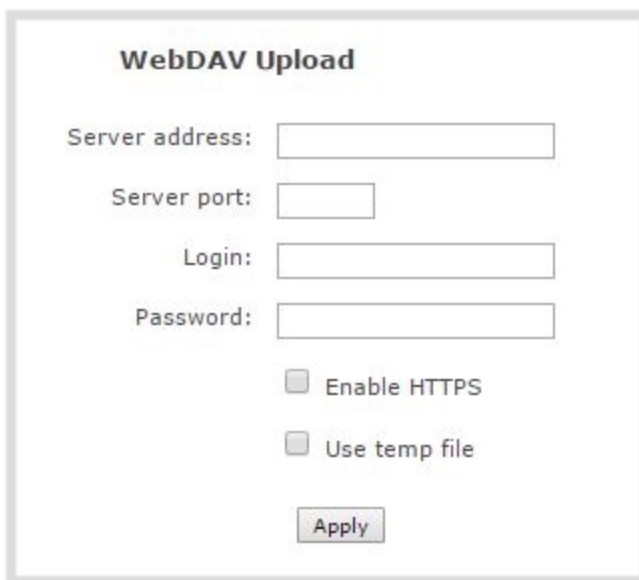
Name	Description / Options
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4 or .avi).

Prerequisites

- Channels and recorders are already added for AFU, see Choose files to include in AFU

- AFU is enabled and the parameters configured, see Enable AFU and set parameters.

To configure upload to a WebDav server:

1. From the Automatic File Upload configuration page, select **WebDav Client** as the protocol transfer type.

2. Specify the target **Server address**. If your system is configured with DHCP or has a valid DNS configuration (see Configure DHCP), you can use the server's fully qualified domain name instead of the IP address.

3. Specify the **Server Port** used for the target WebDav server. The standard port is 21.

4. Enter the FTP account username in the **Login** field.

5. Enter the FTP account password in the **Password** field. The characters are masked with dots.

6. Select **Enable HTTPS** if you need a secure HTTPS link to the WebDav server.

7. Select **Use temp file** to name files with a temporary filename extension (.part) on the server until

upload is complete.

8. Click **Apply**.

AFU or copy to USB

Pearl Mini has USB 3.0 ports that you can use to copy recordings from the SD card to external USB flash drives or hard drives. Use this to conveniently provide speakers with a copy of their presentation before they leave the presentation venue.

The USB storage device must be formatted with one of the following file systems:

- FAT16
- EXT2
- NTFS

- FAT32
- EXT3

- XFS
- EXT4

There are several different ways you can transfer recordings to a USB storage device:

- AFU to a USB storage device

- Do a one-time copy/move all recordings to USB storage device

- Manually copy recordings to USB storage device

> **STOP** We recommend you only connect one USB device to Pearl Mini at a time. Only one copy or move to USB operation is permitted at a time, even though the UI may appear to let you start a second one. Please wait until the first is complete before starting a new operation.

AFU to a USB storage device

You can transfer recordings to a USB storage device automatically when you select an external USB device as the AFU protocol transfer type using the Admin panel.

USB ports are available on both the back and the front panels of Pearl Mini.

Prerequisites

- A properly formatted USB device must be connected to one of the USB ports, see AFU or copy to USB.

- Channels and recorders are already added for AFU, see Choose files to include in AFU

- AFU is enabled and the parameters configured, see Enable AFU and set parameters.

To configure automatic file upload to a USB storage device:

1. From the Automatic File Upload configuration page, select **External USB Drive** as the protocol transfer type.

External USB drive

Apply

Table 58 *If your Automatic File Upload setting conflicts with your new USB device setting, a message is displayed. Click the* ***fix it*** *link and click* ***Apply****.*

External USB drive

External USB storage is: used to automatically move/copy recorded files (via Automatic File Upload) ▼

⚠ Automatic File Upload is not enabled to fix it, click here

Apply
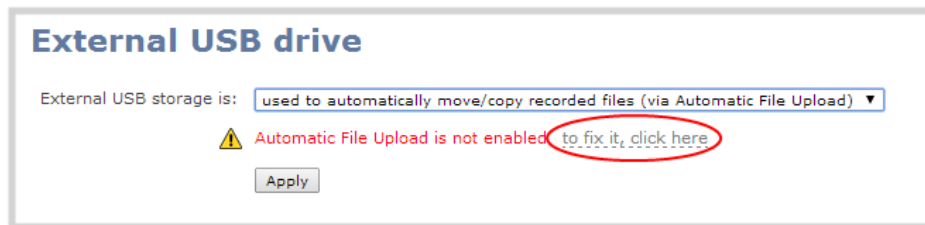
> The fix it link disables any other type of automatic file upload you have configured. When you are done with USB uploads, return to the **Automatic File Upload** configuration page and reconfigure your AFU settings.

2. Select **Create a subfolder for each channel** to have recordings organized by channel.

3. Click **Apply**.

Do a one-time copy/move all recordings to USB storage device

When one-time move/copy of files is configured, Pearl Mini automatically starts copying files as soon as you connect a USB storage device to one of the USB ports.

Newest recordings are copied first. Files continue copying over until one of the following events occur:

- all files are copied
- the specified maximum number of files are copied
- the target drive runs out of storage space

File that are currently recording do not transfer until recording ends.

The following table describes the options available for a one-time move/copy of files to a USB storage device.

Table 59 *One-Time Move/Copy File Transfer Options*

Name	Description
create subfolder with serial number (<serial>)	If checked, the transfer process creates a sub-folder with the system's serial number on the USB drive. This is useful if you are using the same drive to collect recordings from multiple systems and want to know which system they came from.
create subfolder for each channel	If checked, the transfer process creates a sub-folder for each channel and recorder (within the subfolder for the serial number, if that option is also selected). Files are copied to their respective folders.
remove after copying	If checked, the file(s) are removed after being copied to the USB drive. Checking this box makes the transfer a move instead of a copy.
mark file as downloaded	If checked, the files that are downloaded are marked with a downloaded icon when viewing file lists. This has no effect if remove after copying is checked.
ignore already downloaded files	If checked, files that were previously downloaded or marked as downloaded are not included in subsequent downloads.

> If your USB drive has no activity indicator to let you know when the transfer is complete, select the one-time move/copy option to **remove after copying** or **mark the file as downloaded** so that you know when the transfer has finished.

Prerequisites

- A properly formatted USB device not connected to a USB port on Pearl Mini.

To configure a one-time copy of all recorded files to a USB storage device:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, select **External USB Drive**. The External USB Drive configuration page opens.

3. Select **used for one-time move/copy of the recorded files (upon insertion)**.

> If a conflict is reported regarding the Automatic file upload settings, click **Fix it** or go to the Automatic File Upload configuration page and either disable automatic file upload or switch to a non-USB based upload type.

4. Check the options you want to use for the one-time move/copy file transfer and click **Apply**.

5. Insert the USB storage device into one of the USB ports. File transfer starts automatically.

6. Follow the steps to Safely eject USB storage device when the activity light on the USB storage device stops flashing. If your USB device doesn't have activity indicators:

   a. Check the **Recording** list for each channel and the **Recorded Files** list for each recorder to verify if there are files that have yet to be copied.

   b. Safely eject USB storage device when you are satisfied all files have been copied, or if you notice the USB storage device is out of space, see View available USB storage space.

Manually copy recordings to USB storage device

You can manually copy recorder files to a USB drive connected to Pearl Mini.

This procedure is separate from automatic file upload and does not need any pre-configuration in the automatic file upload page.

To manually copy recorded files to a USB device:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **External USB Drive link**. The External USB Drive configuration page opens.

3. Select **used to manually move/copy selected files via the Admin panel** and click **Apply**.

> If a conflict is reported regarding the Automatic file upload, click **Fix it** or go to the Automatic File Upload configuration page and disable automatic file upload or switch to a non-USB based upload type.

4. Insert your USB storage device into an available USB port on Pearl Mini and do one of the following:

    a. To download files for a specific channel, click **Recording** from the Channels menu.

    b. To download files for a recorder, select a recorder from the Recorders menu.

5. Check the files you want to download and do one of the following:

    a. Click **Copy Selected to external drive** to copy the files to the USB drive.

    b. Click **Move Selected to external drive** to move the files and delete them off of Pearl Mini.

In this example, the first file is currently recording and cannot be downloaded.

6. Follow the steps to Safely eject USB storage device when you're done.

View available USB storage space

When you insert a USB storage device into an available USB port and select an **External USB Drive** action other than **ignored** (i.e. manual copy, automatic copy, etc), the total and free space are calculated and displayed in the Admin panel.

When you insert your USB storage device into an available USB port, an External storage usage information tab appears at the bottom of the menus panel.
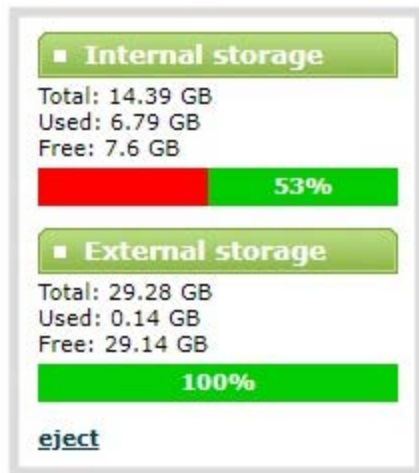
Safely eject USB storage device

When you're done saving recordings to the USB storage device, you can safely eject it using the link at the bottom of the Admin panel page.

To safely eject the USB drive:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. At the bottom of the menus panel, click **eject** and click **OK** when prompted.
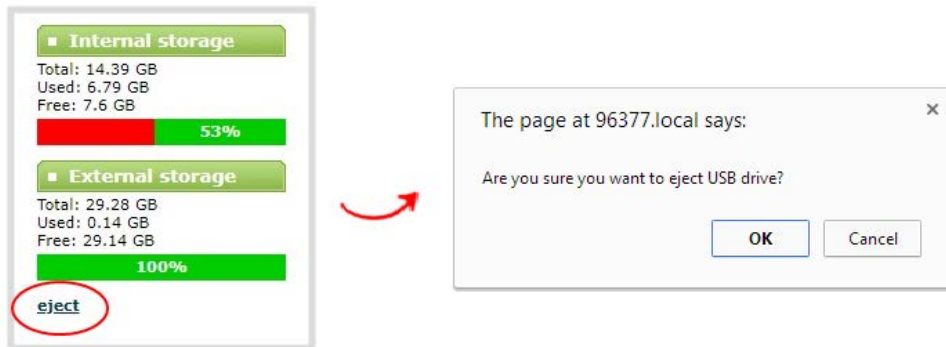
It's now safe to disconnect the USB storage device from Pearl Mini.

View the AFU log

A log is kept of automatic file uploads. You can view the AFU log using the Admin panel, If you want to view the AFU status, see View AFU status

To view the AFU log:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Automatic File Upload**. The Automatic File Upload configuration page opens.
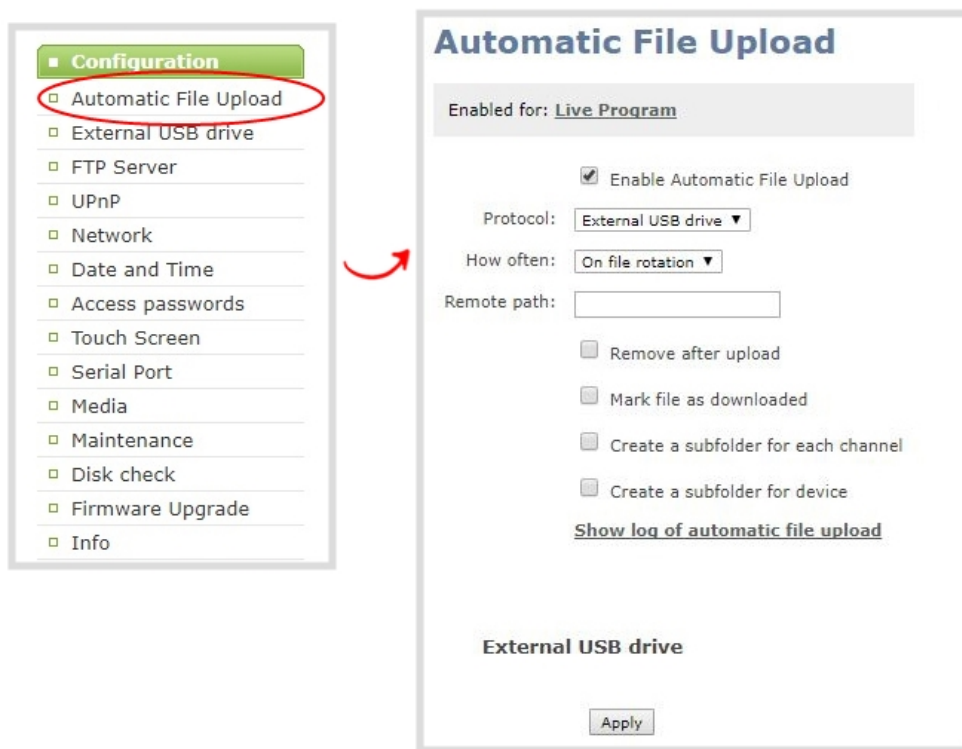
3. Click **Show log of automatic file upload**. The log page opens. If no logs are present, the page is blank.

4. Click the browser's back button when you are done.

Manage the AFU queue

The AFU queue displays a list of recording files waiting to be uploaded. Individual file details can be viewed using the Admin panel.

View the AFU queue

You can view the list of files that are queued for automatic upload using the Admin panel.

To view the AFU queue:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Automatic File Upload**. If there are files to be uploaded, they are displayed under the Upload Queue header.
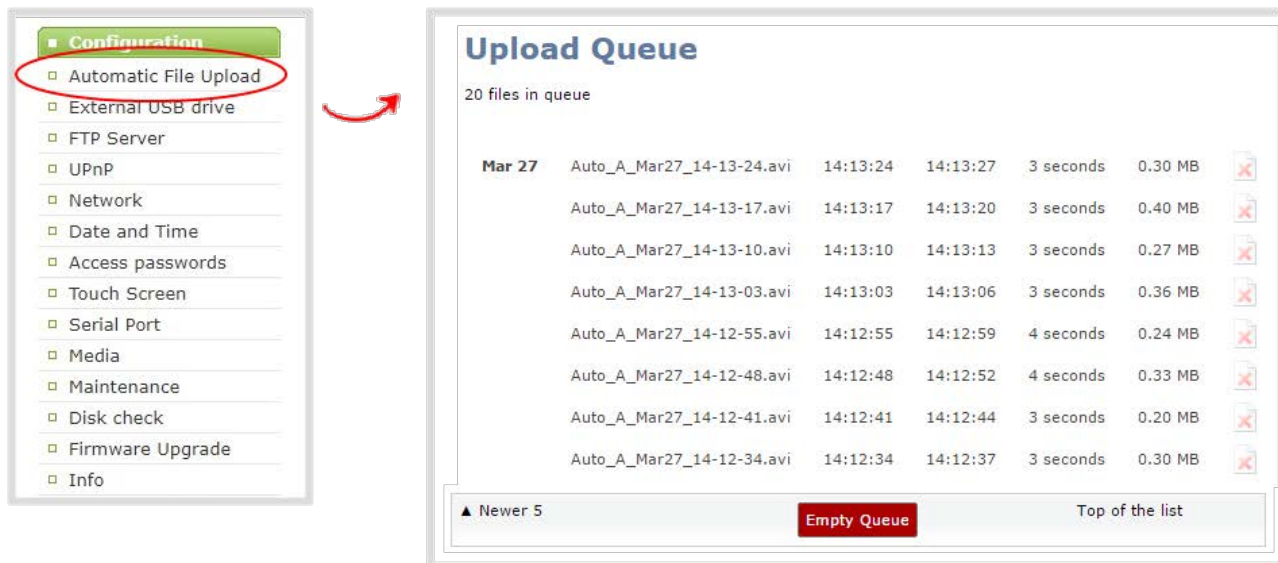
Change how the AFU queue displays

You can change how the AFU queued content is displayed using the Admin panel.

To change how the AFU queued content is displayed:

1. Navigate to the bottom of the upload queue list and select either **Newer 5** or **Top of the List** to change how the content in the AFU queue displays.

Auto_A_Mar27_14-11-51.avi	14:11:51	14:11:55	4 seconds	0.24 MB	✕
Auto_A_Mar27_14-11-44.avi	14:11:44	14:11:48	4 seconds	0.33 MB	✕
▲ Newer 5		**Empty Queue**		Top of the list	
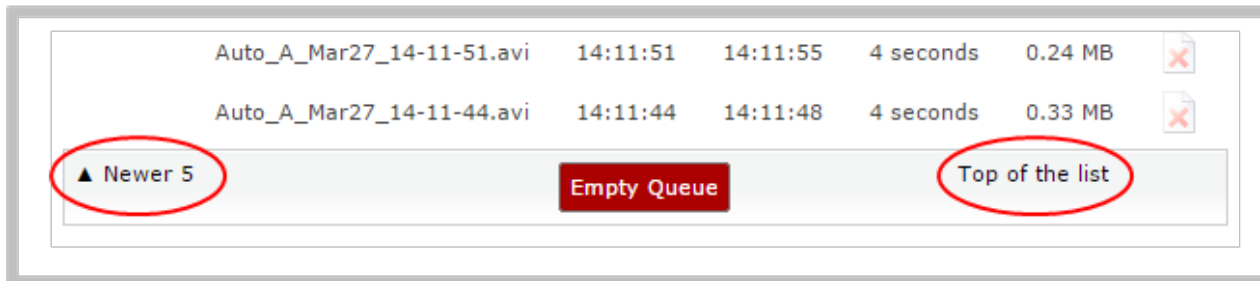
> The upload queue can display only 15 files at one time. Additional content is still stored and is viewed in increments of five files when you select **Newer 5**.

Delete content in the AFU queue

Files can be deleted from the upload queue, either individually or as a group.

To delete content from the upload queue:

1. Navigate to the bottom of the upload queue and click **Empty Queue** to delete the entire upload queue, or click the red 'X' icon at the end of each row to remove files individually.

> There is no confirmation prompt after clicking **Empty Queue**. The queue is immediately deleted. You cannot restore the deleted queued files.

Auto_A_Mar27_14-11-51.avi	14:11:51	14:11:55	4 seconds	0.24 MB	✕
Auto_A_Mar27_14-11-44.avi	14:11:44	14:11:48	4 seconds	0.33 MB	✕
▲ Newer 5		**Empty Queue**		Top of the list	
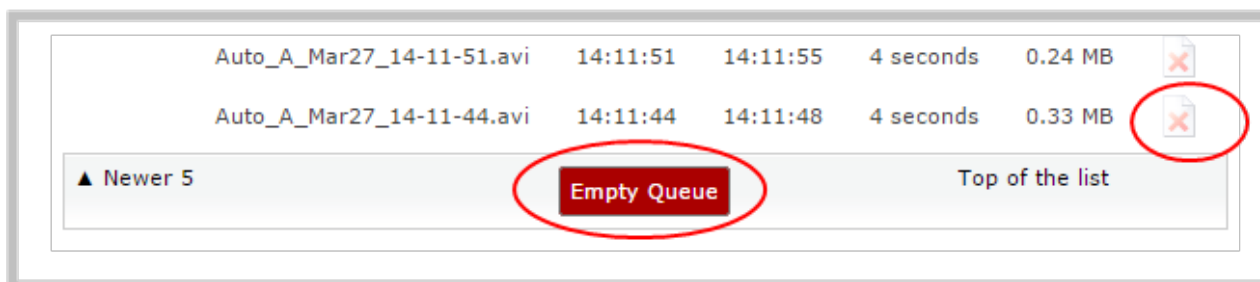
Local FTP server

Pearl Mini can act as an FTP server, allowing you to manually or automatically connect to the system and download recordings. Depending on configuration of the FTP server, you may also be able to remotely delete files after download, maximizing available system storage.

> 🛑 When using an FTP server to download a file, it is possible to start the download while that file is still in the process of being recorded. This results in an incomplete file. To avoid this, check the status of the file in the Admin panel before beginning the download process.

Topics include:

- Configure the local FTP server
- Using the local FTP server

Configure the local FTP server

You can setup the local FTP server on Pearl Mini using the Admin panel.

The following table describes the configuration parameters to setup Pearl Mini's local FTP server.

Table 60 *FTP Server Configuration Parameters*

Name	Description
Enable FTP access	The check box controls whether or not the system acts as an FTP server. By default this is disabled.
FTP user name	Select one of the system users: admin, operator, or viewer. The ftp password will be the access password for the selected user. By default the admin user is selected.
Enable FTP DELETE command	Controls whether or not FTP users can delete files. By default file deletion is not permitted.

To configure Pearl Mini's local FTP server:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **FTP Server**. The FTP Server configuration page opens.

FTP Access Configuration

Enable FTP access ☐

FTP user name   [admin ▼]

Enable FTP DELETE
command ☐
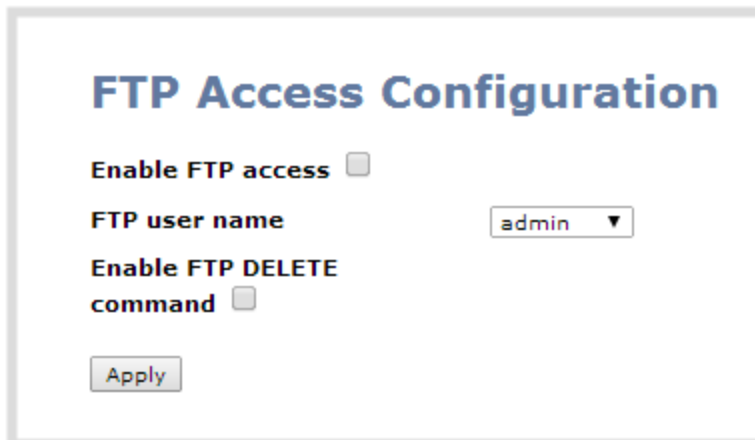
[Apply]

3. To enable or disable the FTP server, do one of the following:

   a. Check **Enable FTP access** and select a user from the **FTP user name** drop down. Then click **Apply** to enable the FTP server.

   b. Uncheck **Enable FTP access** and click **Apply** to disable the FTP server.

   > The ftp password is the regular access password for the selected user. See **User administration** for details on user names and passwords.

4. To allow or disable FTP users to delete files, do one of the following:

   a. Check **Enable FTP DELETE command** and click **Apply** to allow users to delete files.

   > Any currently logged in ftp users must log out and back in again to have access to the command.

   b. Uncheck **Enable FTP DELETE command** and click **Apply** to disable file deletion by FTP.

   > Any currently logged in users will continue to have access to the delete command until they log out and log in again.

Using the local FTP server

Once you have configured a local FTP server, you can use the tool of your choice to download files from Pearl Mini.

Files are stored in a folder structure with a folder for each channel and a folder for each recorder. Channel and recorder numbers are displayed next to the name of the channel or sources in the Admin panel.

- Channel folders are labeled *video<channel number>* (i.e. video3 for channel 3)

- Recorder folders are labeled *videom<recorder number>* (i.e. videom1 for the first recorder).

Prerequisites

- The IP address of your Pearl Mini, see Verify IP address and MAC address of Pearl Mini

- An FTP tool

- The username and password for your FTP user, see Configure the local FTP server

In the following example, the IP address of Pearl Mini is 192.168.1.210, the username is **admin**, there is no password, and the Windows command line ftp utility is used.

To connect to the FTP server:

1. Open a command window on Windows (alternatively open a terminal window on Linux/Mac, or open your FTP utility of choice).

2. Establish an ftp connection using the command: **ftp 192.168.1.210**

3. Provide the username: *admin* (provide the username of your FTP user).

4. Provide the password: (provide the correct password for your FTP user).

5. Type **dir** to see the file structure.

```
Administrator: C:\Windows\system32\cmd.exe - ftp  192.168.1.210

c:\>ftp 192.168.1.210
Connected to 192.168.1.210.
220 Operation successful
User (192.168.1.210:(none)): admin
331 Password
Password:
230 Operation successful
ftp> dir
200 Operation successful
150 Directory listing
total 48
drwxrwxrwx    4 0         0              4096 Feb 12 20:37 video1
drwxrwxrwx    3 0         0              4096 Feb 12 19:35 video10
drwxrwxrwx    3 0         0              4096 Feb 13 14:50 video11
drwxrwxrwx    2 0         0              4096 Feb 11 15:22 video2
drwxrwxrwx    3 0         0              4096 Feb 11 15:38 video3
drwxrwxrwx    3 0         0              4096 Feb 12 14:43 video4
drwxrwxrwx    3 0         0              4096 Feb 12 14:44 video5
drwxrwxrwx    3 0         0              4096 Feb 12 15:22 video6
drwxrwxrwx    3 0         0              4096 Feb 12 15:22 video7
drwxrwxrwx    3 0         0              4096 Feb 12 15:22 video8
drwxrwxrwx    3 0         0              4096 Feb 12 15:52 video9
drwxrwxrwx    4 0         0              4096 Feb 13 14:35 videom1
226 Operation successful
ftp: 793 bytes received in 0.00Seconds 793000.00Kbytes/sec.
ftp>
```

6. Use **dir** or your tool's GUI to look in each folder for recordings.

7. Use **get** or your tool's transfer mechanism to transfer files to your computer.

```
ftp> dir videom1
200 Operation successful
150 Directory listing
total 920
-rw-r--r--    1 0         0              934130 Feb 13 14:35 VGA.1392302138.Recorder_1.avi
drwxrwxrwx    2 99        99               4096 Feb 12 20:44 trash
226 Operation successful
ftp: 163 bytes received in 0.00Seconds 163.00Kbytes/sec.
ftp> get videom1/VGA.1392302138.Recorder_1.avi
200 Operation successful
150 Opening BINARY connection for videom1/VGA.1392302138.Recorder_1.avi (934130 bytes)
226 Operation successful
ftp: 934130 bytes received in 0.08Seconds 12131.56Kbytes/sec.
ftp>
```

8. If enabled in the FTP configuration page, delete the file after downloading it by issuing the delete command, or using your tool's delete mechanism.

> If the delete command is not enabled, attempting to delete a file will result in an Unknown Command error.

PART 5: Maintenance

Keep your Pearl Mini running smoothly and operating with the latest firmware. Learn the maintenance features of Epiphan Live and different ways you can configure and operate Pearl Mini using third party tools over HTTP or RS-232.

Topics include:

- Power down and system restart
- Perform a factory reset
- Firmware upgrade
- Support
- Storage space maintenance
- Third party integration

Power down and system restart

You can perform the following tasks:

- Reboot using the Admin panel
- Power off the device using the Admin panel
- Power off the device using the power button

Reboot using the Admin panel

To reboot Pearl Mini using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, click **Maintenance**. The maintenance page opens.
3. Click **Reboot Now** and click **OK** when prompted.

Power off the device using the Admin panel

You can use the Admin panel to power off Pearl Mini. The power button on Pearl Mini is a toggle switch. If you power off the device using the Admin panel, the power switch remains in the on state. To power back on, you must double press the power button.

To power off Pearl Mini using the Admin panel:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, select **Maintenance**. The maintenance page opens.

3. Click **Shutdown Now** and click **OK** when prompted.

Power off the device using the power button

You can manually shut down Pearl Mini using the power button.

The power button is located on the rear panel beside the power input jack.

To power off Pearl Mini manually, press the power button on the rear panel once.

Backup your Pearl Mini setup

Configuration presets are the perfect way to backup your Pearl Mini setup so that you can reapply it later without worrying if someone changes your settings or does a factory reset.

You can create a configuration preset from the Configuration menu when you select **Maintenance**, see Configuration presets.

Perform a factory reset

Use the Admin panel to perform a factory reset and restore the configuration of your Pearl Mini to the manufacturer's original default settings.

> 🛑 Performing a factory reset erases all your input port settings (video and audio), channels, configuration presets, network settings, all locally saved media files and recordings from Pearl Mini.
>
> Consider applying a factory default configuration preset instead if you want to preserve the uploaded media files, configuration presets, and channel recordings, see **Configuration presets**.

To perform a factory reset:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Maintenance**. The maintenance page opens.

   Factory reset

   Factory reset   [Reset]

   WARNING: All recordings, branding files, configuration presets, channels and recorders will be removed!

3. Click the **Reset** and click **OK** when prompted.

   The page at 192.168.0.183 says: ✕

   Do you really want to reset the device?
   WARNING: All recordings, branding files, configuration presets, channels and recorders will be removed!

   [OK]   [Cancel]
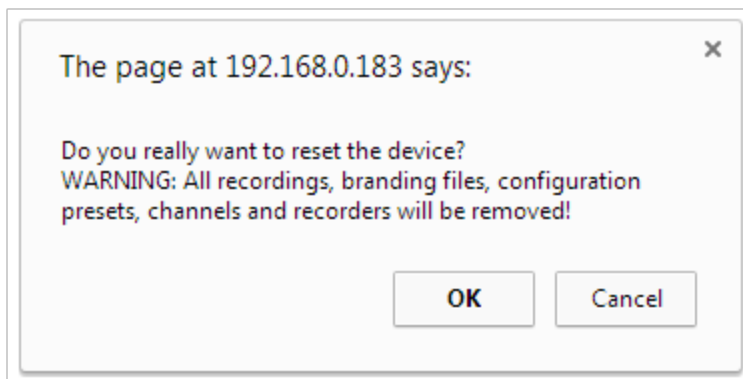
4. The system resets to factory defaults and reboots. Wait for the system to finish rebooting before configuring Pearl Mini.

Firmware upgrade

When you register your product with Epiphan, can choose to receive email notifications whenever firmware updates are available. To take advantage of exciting new features and important fixes for your Pearl Mini, install new firmware whenever the system indicates that a firmware update is available.

Topics include:

- Check for firmware updates
- Update the firmware

Check for firmware updates

Your Pearl Mini automatically checks for firmware updates if the **Enable connection to maintenance server** option is checked on the **Maintenance** page of the Admin panel. You can also manually check for updates If your Pearl Mini has internet access.

> When **Enable connection to maintenance server** is checked, the built-in firmware update mechanism checks for updates for your specific product and hardware version automatically.

To manually check for new firmware:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, select **Firmware Upgrade**. The firmware upgrade page opens.

3. Click **check for updates** beside the current firmware version. If an update is found, a red box appears in the top left side of the Admin panel with a link to download and install the firmware.

Firmware update
Version **3.10.0h** is available.

Download and install
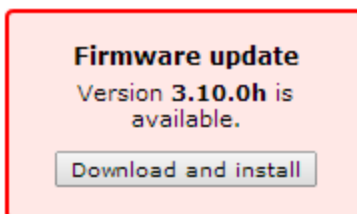
Update the firmware

Schedule a time to when you can update the firmware without negatively impacting viewers or automatic file upload and recording schedules.

It's good practice to make a backup of your current configuration before applying a firmware update so that you can revert to the previous firmware if needed, see Create a configuration preset.

If your Pearl Mini has internet access, the easiest way to install a firmware update is to use the download link that's provided when you check for new firmware. If you have a Pearl Mini firmware file that was provided to you by Epiphan Video, you can install the new firmware from that file.

While the firmware is updating, the touch screen displays a firmware update in-progress notice. All streaming and recording functions stop until after the firmware upgrade is complete.

Installing new firmware takes a few minutes, after which the system reboots. Depending on the upgrade, a disk rebuild may be required, causing the restart process to take more time. Please be patient and wait for the system to finish rebooting.

> 🛑 Do not interrupt power to the system during a firmware upgrade.

To perform a firmware update:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. (Optional) Save a copy of the current system configuration. See Configuration presets.

3. From the Configuration menu, select **Firmware Upgrade**. The firmware upgrade page opens.

4. Do one of the following:

    a. Click **check for updates**. If a red box appears in the top left side of the Admin panel, click **Download and install**.

    b. Click **Choose File** and select the firmware upgrade file that's located on your admin computer, then click **Apply**. The system unpacks and verifies the file. If the file is valid, the upgrade begins.

   If the touch screen is enabled, a notice that the firmware update is in progress appears.

> 🛑 Do not interrupt power to the system during the firmware upgrade.

5. When the firmware update is complete, a message lets you know that Pearl Mini is going to reboot. Wait for the system to restart.

Firmware update
Rebooting...
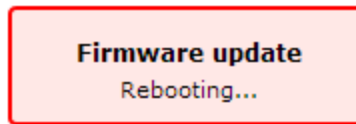
6. Connect to the Admin panel and login as **admin**, see Connect to the Admin panel.

7. From the Configuration menu, select **Firmware Upgrade**. The firmware upgrade page opens. Verify that the firmware version is the expected new version.

If in the rare occasion the firmware update fails, the touch screen reports the failure. Please collect system information such as the serial number of Pearl Mini, the previous firmware version (if known), and the new firmware version and contact **info@epiphan.com**

Firmware Update Error
⚠
E-Mail: info@epiphan.com

Support

Your Pearl Mini comes with a one-year complimentary support plan starting one year from the original product shipment date. You can purchase a 2-year extended support plan from Epiphan Video for a total of three years of product support from the original product shipment date:

- **SupportPlan** offers a 2-year support extension
- **SupportPlan+** offers a 2-year support extension plus remote troubleshooting support

Remote troubleshooting support allows the Epiphan support team to remotely access Pearl Mini to help troubleshoot issues and reset lost admin passwords, see Configure remote support. No private information is sent to the Epiphan maintenance server during a remote session. For more information about service plans, see www.epiphan.com/supportplan.

To contact Epiphan support:

- **Email**: support@epiphan.com
- **Online chat**: www.epiphan.com/support (Monday to Friday between 9am and 5pm Eastern)
- **Call**: 1-877-599-6581 / 613-599-6581

From time to time, Epiphan support may ask you for logs from your system. Follow the instructions in this section to download the log files for support, see Download logs and "allinfo".
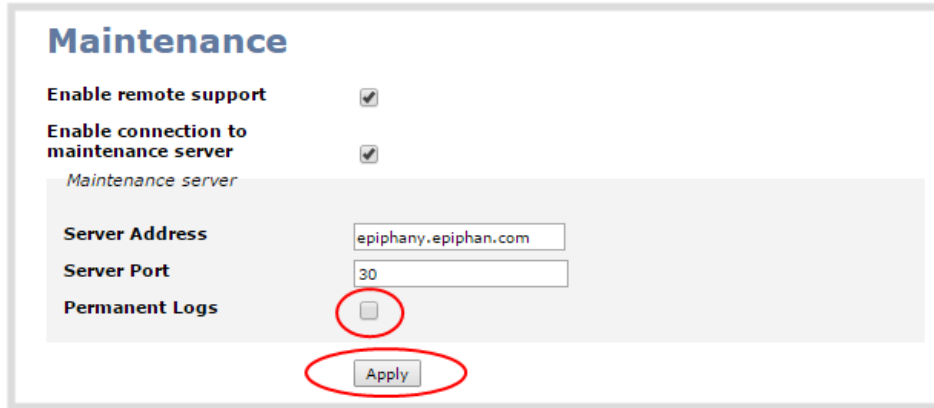
> ☑ Remote support is only provided for systems covered by SupportPlan+.

Download logs and allinfo file

If requested by Epiphan support, you can download the logs files and/or "allinfo" data from your system. These files help our support team troubleshoot problems.

To download the logs and allinfo file:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, click **Maintenance**. The maintenance page opens.

3. Check **Permanent Logs** and click **Apply**.

4. Click **Maintenance** again to refresh the maintenance page and click **Download permanent logs**. A zip file containing system downloads.

5. From your browser, run the **allinfo** script. A file is saved to your computer.

> http://<ip address of your system>/admin/allinfo.cgi

6. Share the log files and the allinfo results with Epiphan support.

Configure remote support

Remote support is enabled on Pearl Mini by default and allows the Epiphan support team to remotely access Pearl Mini to help you troubleshoot issues and reset lost admin passwords.

Your network must allow access to the Epiphan maintenance server, which has the domain name epiphany.epiphan.com. Pearl Mini must be able to resolve this domain name to connect to the Epiphan maintenance server for remote support.

Remote support uses ports 22 and 30. Ensure that these ports are opened to allow remote communication. If your Pearl Mini is on a network that is protected from the Internet by a firewall, consult with your network administrator to configure your network to allow remote Internet access through the firewall for those ports and to add epiphany.epiphan.com to the network's allowed list.

> Remote support is only provided for systems covered by SupportPlan+. For more information about service plans, see **www.epiphan.com/supportplan**.

To configure remote support:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Maintenance**. The maintenance page opens.

Maintenance

Enable remote support	☑
Enable connection to maintenance server	☑

Maintenance server

Server Address	epiphany.epiphan.co
Server Port	30
Permanent Logs	☐

[Apply]
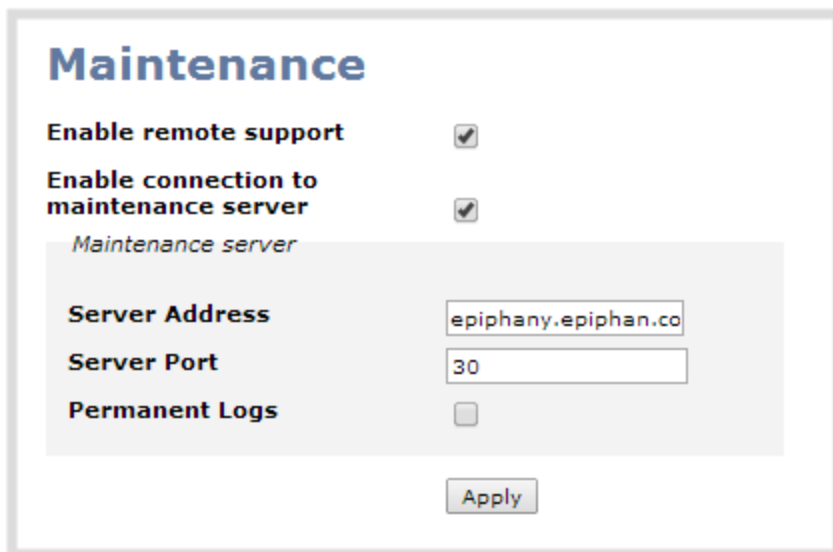
3. Check **Enable remote support**.

4. Check **Enable connection to maintenance server**.

5. Ensure **Server Address** is *epiphany.epiphan.com*, unless Epiphan support directs you to change it.

6. Set the **Server Port** to 30, unless Epiphan support directs you to change it.

7. Click **Apply**.

8. Test that Pearl Mini can access the maintenance server:

    a. From the Configuration menu, click **Network**.

    b. In **Network Diagnostics**, enter **epiphany.epiphan.com** and click **ping**.

    c. The result of the ping should show an IP address for epiphany.epiphan.com. Report any packet losses to Epiphan support.

9. If Pearl Mini can't reach the maintenance server, check the network settings (see Configure DHCP) to ensure DHCP is selected or a DNS server is listed, then try again. Consult with your network administrator if problems persist.

10. If Pearl Mini reaches the maintenance server, ensure your firewall has port 30 open.

11. Confirm with Epiphan support that they are able to access your Pearl Mini for remote troubleshooting.

Disable remote support

Remote support is enabled by default. You can turn remote support off for your Pearl Mini using the Admin panel.

> 🛑 Disabling remote support removes the ability for Epiphan to reset a lost admin password on your Pearl Mini. If you forget the admin password and remote support feature is off, you will need to return the system to Epiphan for reprogramming.

To disable remote support for your Pearl Mini:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Maintenance**. The maintenance page opens.

3. Uncheck **Enable remote support** to disable incoming connections from Epiphan.

4. Uncheck **Enable connection to maintenance server** to disable outgoing links to the Epiphan maintenance server.

5. Click **Apply**.

Storage space maintenance

Pearl Mini has local storage for internal processes and 2 GB of that space is allocated for uploaded media, like image files that you add to your channel layouts. You can see how much space you have for media files using the Admin panel.

Recordings that you make are saved to the SD card installed in Pearl Mini. You can check how much space you have left on the SD card using the Admin panel and from the touch screen.

Topics include:

- Check SD card storage capacity
- Check media storage capacity
- Read data from the SD card

Check SD card storage capacity

In the Admin panel, the amount of storage space that's available on the SD card is shown at the bottom of the menu panel and on the SD card configuration page. You can also check the capacity of the SD card using the touch screen on Pearl Mini. The total amount of storage capacity depends on the size of SD card you installed.

> 📋✅ To check the SD card capacity using Epiphan Live, see **Configure Dashboard panels**.

It's good practice to check how much storage space you have available. If the amount of storage is low, you can swap SD cards or remove some of the recorded files, see Manage recorded files and File and recording transfer.

To check the SD card capacity:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2. To check storage capacity using the Admin panel, view the **Internal Storage** section at the bottom of the menu panel. The bar will be mostly green if there is lots of space left, or mostly red if storage space is nearly full.

If no SD card is installed, the following appears:
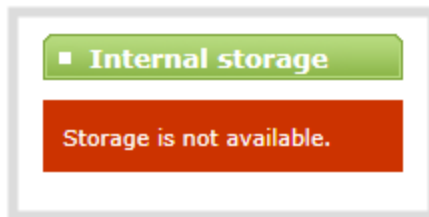
3. To check storage capacity using the touch screen, tap the Settings gear icon on the touch screen and select **System status**.

Check media storage capacity

Pearl Mini has 2 GB of internal storage that's allocated for uploaded media, like image files that you add to your channel layouts. You can see how much space you have for media files using the Admin panel.

To check media storage capacity:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.

2. From the Configuration menu, click **Media**. The Media configuration page opens with the amount of capacity listed at the top of the page.

Read data from the SD card

Pearl Mini has support for removable SD cards, which are formatted to use the ext4 file system and can only be read with a computer running Linux.

Third party integration

Pearl Mini has a comprehensive set of APIs to allow integration with third party tools.

You can use either the HTTP or RS-232 commands to configure your system exactly how you need it. You can start and stop recordings, configure meta data on a channel, or even change a channel's frame size and encoding settings using the API.

Topics include:

- Controlling Pearl Mini using RS-232 / serial port
- Controlling Pearl Mini using HTTP commands
- Configuration keys for third party APIs

Controlling Pearl Mini using RS-232 / serial port

Pearl Mini has an RS-232 / serial port control interface (via USB) for integration with existing control room and board room equipment.

Important considerations

- Each command sent to Pearl Mini over RS-232 must be terminated with a line feed (LF) character (ASCII code 10). Make sure that your software adds the line feed to each command.

- For values with spaces, enclose the value in quotation marks. For empty values, use empty quotation marks with nothing between.

- You must always follow a "SET" command in RS-232 with the "SAVECFG" command. Otherwise the new configuration setting(s) will not take effect. See the "SET" examples that follow.

For a complete list of supported SET and GET parameters, see Configuration keys for third party APIs . To connect the RS-232 cable and configure RS-232 on Pearl Mini, see Connect and configure the RS-232 port

The following examples show how to use RS-232 commands to control Pearl Mini:

To start recording on channel 2:

> START.2

To stop recording on channel 2:

> STOP.2

To start recording on all channels and recorders:

> START

To get the value of the frame size (resolution) for channel 2:

> GET.2.framesize

To set the frame size (resolution) on channel 2, enclose the parameter in quotes to preserve the spaces:

> SET.2.framesize="640 x 480"
> SAVECFG

To enable broadcasting audio on channel 2:

> SET.2.audio=on
> SAVECFG

To disable broadcasting audio on channel 2:

> SET.2.audio=""
> SAVECFG

Connect and configure the RS-232 port

To connect your control equipment to Pearl Mini, you need a standard RS-232 null-modem cable and a USB to RS-232 serial adapter cable. Adapter cables are not included with Pearl Mini.

Only certain adapter chipsets are supported, Epiphan recommends this adapter cable from Startech.

To connect the serial port cable:

1. Attach the cable to the control interface.

2. Connect the USB to RS-232 serial adapter to the null-modem cable.

3. Connect the USB to RS-232 serial adapter to one of the system's USB ports.

The only configuration available for the serial port is flow control. Flow control changes the rate of data transfer over the cable. Some communication settings are static and cannot be changed. The static settings are:

- Baud rate set at 19200

- Parity set to none

- Stop bits set to one

To configure serial port flow control:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Configuration menu, click **Serial Port** . The serial port configuration page opens.

3. Select **Hardware**, **Software**, or **None** from the drop-down menu.

Table 61 *Serial Port Flow Control Options*

Label	Description / Options
Hardware	A hardware handshake is used for flow control, which is also called RTS / CTS flow control. See

Label	Description / Options
	the manual for your control terminal to check if a hardware handshake is needed.
Software	A software handshake that uses XON/XOFF characters to control the flow of data. See the manual for your control terminal to check if a software handshake is needed.
None	No flow control is used. Only select this if your control terminal doesn't use a handshake.

4. Click **Apply**.

Control Pearl Mini with RS-232

You can use the null-modem cable and your control terminal software to issue commands to Pearl Mini, such as when to start or stop recording, and to retrieve or set the value of certain parameters.

> 🛑 Each command sent to Pearl Mini over RS 232 must be terminated with a line feed (LF) character (ASCII code 10). Make sure that your software adds the line feed to each command.

Some commands require a *channel* or *recorder* name as an argument. In those commands, the channel or recorder name is separated from the command name by a period. The channel name value can be either the name or the index of the recorder or channel. Use of the index is recommended.

A channel's index number is located in the Channels Menu using the Admin panel. The channel index number turns red to indicate it is recording. For example, to address this channel using RS-232 commands, use the index **1**.
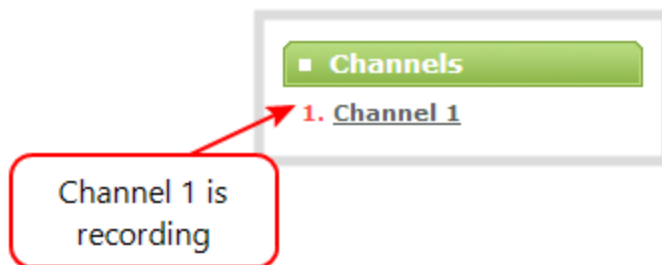
For recorders, combine the recorder's number with the prefix **m**. In the following example, the second recorder's index is 2. To address this recorder using RS-232 commands, use the index **m2**.
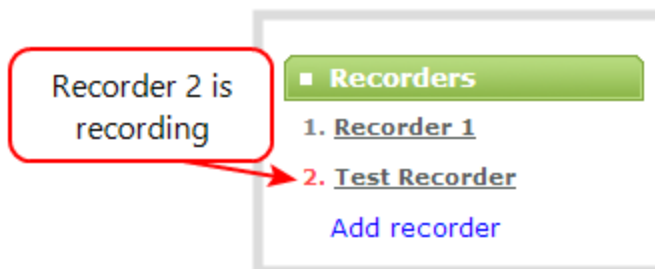
The following table describes the supported RS-232 commands.

Table 62 *Supported RS-232 Commands*

Command Name	Description
Recording Commands	
START.\<channel\> START.\<recorder\>	Starts recording for the provided channel or recorder. This can alternatively be accomplished with the following set commands: SET.\<channel\>.rec_enabled=on SAVECFG If the channel is already recording, the current recording is continued.
START	Starts recording for all channels and recorders. 📋 There is no RS-232 command to restart recording. If recording is already active when the start command is issued, the recording continues.
STOP.\<channel\> STOP.\<recorder\>	Stops recording for the provided channel or recorder. This can alternatively be accomplished with the following set commands: SET.\<channel\>.rec_enabled="" SAVECFG
STOP	Stops recording for all channels and recorders.
SNAPSHOT.\<channel\>	Takes a snapshot image of the current channel (supported only if the channel is configured to use the Motion JPEG codec). Snapshots are saved with recording files on the system.
SNAPSHOT	Takes a snapshot image (supported only configured to use the Motion JPEG codec). Snapshots are saved with recording files on the system.

Command Name	Description
Configuration Commands (see Configuration keys for third party APIs for available keys)	
GET.<channel>.<key> GET.<recorder>.<key>	Gets the saved value of a given parameter for the specified channel or recorder.
SET.<channel>.<key> SET.<recorder>.<key>	Sets the value of a given parameter for the specified channel or recorder. The value is not saved until the SAVECFG command is sent.
SAVECFG	Saves the parameters modified by the SET command.
Status Commands	
STATUS.<channel> STATUS.<recorder>	Reports the recording status of the specified channel or recorder. Status is one of: • RUNNING • STOPPED • UNINITIALIZED
STATUS	Reports the recording status of each channel and recorder. Status is one of: • RUNNING • STOPPED • UNINITIALIZED
FREESPACE	Reports the free storage space, in bytes.
RECTIME.<channel> RECTIME.<recorder>	Reports the elapsed recording time in seconds for the current file on the specified channel or recorder.
RECTIME	Reports the elapsed recording time in seconds for the current file on each channel.

Pearl Mini returns a status change message whenever changes are made.

Table 63 *RS-232 Status Changed Messages*

Command Name	Description
STATUS.<channel> <status>	Provides the status of the recording service for the channel as either: • Running • Stopped

Command Name	Description
	• Uninitialized The Uninitialized status is sent when there is an internal error. Check the system for more details.

Controlling Pearl Mini using HTTP commands

Pearl Mini has an HTTP API interface for configuration and control by third party applications or scripts that send commands as a series of URLs. Commands are sent to one of two URLs and specify the target configuration item.

Some commands require a *channel* or *recorder* name as an argument. A channel's index is found by looking at the Channels list in the Admin panel. In the following example, the channel with index 1 is currently recording (its index number is red). To address this channel using http commands, use the index **channel1**.
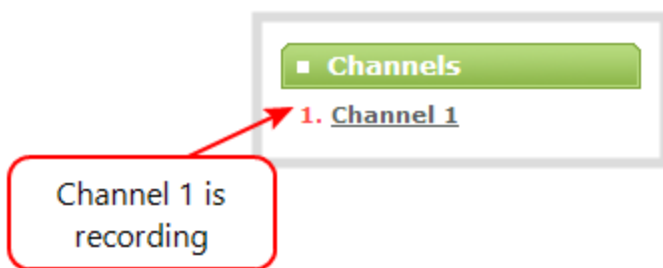
For recorders, combine the recorder's number with the prefix **m**, as in *channelm*. In the following example, the second recorder's index is 2. To access this recorder using http commands, use the index **channelm2**.
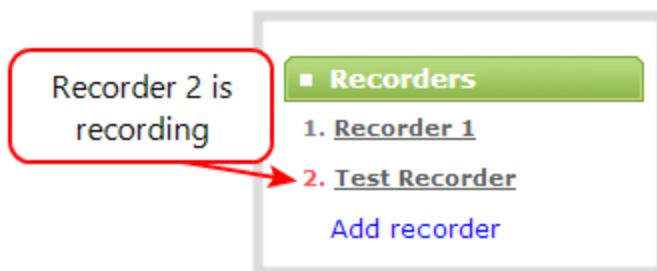
To Get configuration settings:

http://<*address*>/admin/channel<*N*>/**get_params.cgi**?*key*

For recorders, add 'm' before the recorder number (i.e. channelm1 for recorder 1)

http://<*address*>/admin/channelm<*N*>/**get_params.cgi**?*key*

To Set configuration settings:

http://*<address>*/admin/channel*<N>*/**set_params.cgi**?key=*value*

For recorders, add 'm' before the recorder number (i.e. channelm1 for recorder 1)

http://*<address>*/admin/channelm*<N>*/**set_params.cgi**?*key*

Where *<address>* is the IP address of the Pearl Mini, channel*<N>* is the channel number (i.e. *channel2* for channel number two), and channelm*<N>* is for recorders (i.e. *channelm2* for recorder two), *key* is the configuration key for the item being checked or changed (see Configuration keys for third party APIs), and *value* is the value to set for the configuration item.

The following examples show how to use wget to exercise some of the supported HTTP commands.

> For values with spaces, encode space as %20. i.e.: set_params.cgi?framesize=640%20x%20480

The examples assume a system IP address of 192.30.23.45 and admin password is pass123.

To get the type of stream being published and frame size for channel 1:

    wget --http-user=admin --http-passwd=pass123 http://192.30.23.45/admin/channel1/get_
    params.cgi?publish_type&framesize

To set the publish stream type to RTMP Push (6) and at the title "System Stream" for channel 2:

    wget --http-user=admin --http-passwd=pass123 http://192.30.23.45/admin/channel2/set_
    params.cgi?publish_type=6&title=System%20Stream

To start recording on channel 2:

    wget --http-user=admin --http-passwd=pass123 http://192.30.23.45/admin/channel2/set_
    params.cgi?rec_enabled=on

To stop recording on channel 2:

    wget --http-user=admin --http-passwd=pass123 http://192.30.23.45/admin/channel2/set_
    params.cgi?rec_enabled=""

To start recording on recorder 2:

> wget --http-user=admin --http-passwd=pass123 http://192.30.23.45/admin/channelm2/set_
> params.cgi?rec_enabled=on

Multiple requests

You can include multiple key/value pairs in a single command by separating the statements with *&*.

For example, the key for product name is **product_name** and the key for firmware version is **firmware_version**. The command to request both the product name and the firmware version is:

> http://<*address*>/admin/channel1/get_params.cgi?product_name&firmware_version

To turn off publishing (i.e. set to 0) and set the bitrate (vbitrate) to 256,000:

> http://<*address*>/admin/channel1/set_params.cgi?publish_type=0&vbitrate=256K

Third party applications like wget

If you're using a third party application like wget to send commands to Pearl Mini, always include the admin username and password when viewing or setting configuration items.

Specify your Pearl Mini's IP address, password and the key(s) or value(s) you want to query using the following syntax. Note that your system may require use of single quotes around the password to handle special characters such as exclamation marks.

> get_param using wget:
>
> wget --http-user=admin --http-passwd=<*password*> http://<*address*>/admin/channel<*N*>/get_
> params.cgi?<*key*>[&<*key*>]

> set_param using wget:
>
> wget --http-user=admin --http-passwd=<*password*> http://<*address*>/admin/channel<*N*>/set_
> params.cgi?<*key*>=<*value*>[&<*key*>=<*value*>]

Where *<address>* is the IP address of the Pearl Mini, channel*<N>* is the channel number (i.e. *channel2* for channel number two), *key* is the configuration key for the item being checked or changed (see Configuration keys for third party APIs), and *value* is the value to set for the configuration item.

Global variable HTTP commands for custom layouts

Pearl Mini can create global variables using HTTP commands embedded in custom layout as responsive text overlay elements. See Add a text overlay for information about adding a global variable into a custom layout.

Important considerations for global custom layout variables

- Each system variable must have its own unique name

- System variable names and variable values are case sensitive

- Each variable name must start with a letter or underscore sign and is followed by any combination of letters, digits and underscore characters [A-Za-z_0-9]{0,32} to a limit of 32 total characters (note that saving an empty string to a variable will clear the variable value)

- There is a limit of 1024 total unique system variables per Pearl Mini system.

- System variables can be used in text labels across any number of channels.

- System variable commands can be issued at a frequency of 5 per second, and up to 6 variables may be set in a single command (for example, variables "gpsvar1", "gpsvar2" and "gpsvar3" can be updated in a single command, five times per second). After issuing a set command, all channels using the specified variable(s) are updated. The frequency of commands issued is not influenced by the number of channels on Pearl Mini.

- System variables are considered volatile data and are erased when Pearl Mini reboots.

Set variables – syntax and example

A set command saves a value to a variable, where *<address>* is the IP address of Pearl Mini, *name* is the unique name for each variable, and *value* is the text/character content stored in each variable.

You can set multiple variables at the same time by separating each variable with an "&".

To "set" variables, use the following syntax:

> **http://*<address>*/admin/set_variables.cgi?*name1=value1*[&*nameN=valueN*]**
>
> For values with spaces, encode space as %20. (i.e.: set_variables.cgi?name1=640%20x%20480)
>
> To erase a previously set variable, simply set the variable's name with an empty space.

```
Example: "http://192.168.0.129/admin/set_
variables.cgi?gpsvar1=N103%2068201%20W765%2029712&gpsvar2=S490%2018731%
20E756%2019890&gpsvar3=N123%2046891%20W345%2065431&gpsvar4=S767%2033410
%20E770%2004513"


sets:
"gpsvar1" to "N103 68201 W765 29712"
"gpsvar2" to "S490 18731 E756 19890"
"gpsvar3" to "N123 46891 W345 65431"
"gpsvar4" to "S767 33410 E770 04513"
```

Get variables – syntax and example

A get command returns the value of a variable called *name*. You can return multiple variables at the same time by separating each variable with an "&".

To "get" a variable or a list of specific variablesx:

http://<*address*>/admin/get_variables.cgi?*name1*[&*nameN*]

```
Example: "http://192.168.0.129/admin/get_variables.cgi?gpsvar1"

returns:
"gpsvar1=N103 68201 W765 29712"
```

To "get" a list of **all** variables saved to Pearl Mini:

http://<address>/admin/get_variables.cgi

```
Example: "http://192.168.0.129/admin/get_variables.cgi"

returns:
"gpsvar1=N103 68201 W765 29712
gpsvar2=S490 18731 E756 19890
gpsvar3=N123 46891 W345 65431
gpsvar4=S767 33410 E770 04513"
```

To learn how to use global variables as text overlays in custom channels, see Add a text overlay .

Configuration keys for third party APIs

Using HTTP or RS-232, you can send query and configuration commands to Pearl Mini. For the RS-232 and HTTP syntax, see Controlling Pearl Mini using RS-232 / serial port and Controlling Pearl Mini using HTTP commands.

> 🛑 Using a "SET" command in RS-232 must always follow with the "SAVECFG" command for the new configuration setting(s) to take effect.

When setting keys to values with spaces, use the following syntax.

For RS-232, enclose in quotes:

SET.2.framesize="640 x 480"

For HTTP, encode each space:

%20: set_params.cgi?framesize=640%20x%20480

The following categories of API keys are supported:

- System-level settings keys (read-only)
- System-level settings keys (read/write)
- System-level custom layout keys (read/write)
- Touch screen settings keys (read/write)
- Recording configuration keys
- HTTP server configuration keys
- IP-based access control configuration keys
- UPnP configuration keys
- Broadcast configuration keys
- Channel encoder configuration keys
- Channel layout configuration keys
- Audio configuration keys
- Stream publishing configuration keys
- RTP/UDP configuration keys (Publish type 3)
- MPEG-TS configuration keys (Publish types 4 and 5)
- RTMP push configuration keys (Publish type 6 and 7)

- Livestream configuration keys (Publish type 8)
- Content metadata configuration keys

You can also see the list of supported keys from Pearl Mini when you browse to the following URL, where *<address>* is the IP address of Pearl Mini:

```
http://<address>/admin/http_api.cgi
```

System-level settings keys (read-only)

The following read-only system-level setting keys are supported. The channel number can be omitted from the command when requesting the value for these keys.

Table 64 Supported Read-Only System-level Settings configuration keys

Key	Values	Description
firmware_version	String, including the text FIRMWARE_VERSION=.	The system's firmware version. The value is read-only.
mac_address	String	The system's mac address. Useful for debugging. The value is read-only.
product_name	String	The product's name. Useful to confirm you are communicating with the right product or for debugging purposes. The value is read-only.
vendor	Epiphan Video	Name of the vendor. The value is always "Epiphan Video". The value is read-only.

System-level settings keys (read/write)

The following read/write system-level setting keys are supported. The channel number can be omitted from the command when requesting the value for these keys.

Table 65 *Supported Read/Write System-level Settings configuration keys*

Key	Values	Description
frmcheck_ enabled	on empty string ("")	Enables or disables automatic firmware update checking. To enable firmware update checking, set to on. To disable firmware update checking, set to an empty string ("").
description	string	To give this system a name in the Epiphan discovery utility, specify a description string.

System-level custom layout keys (read/write)

The following read/write system-level custom layout keys are supported.

Table 66 *Supported read/write system-level custom layout keys*

Key	Values	Description
name	Any combination of letters, digits and underscore characters [A-Za-z_0-9]{0,32} to a limit of 32 total characters	Each unique name key contains a variable value. Used for dynamic overlay text in custom layouts (see Controlling Pearl Mini using HTTP commands and Add a text overlay)

Touch screen settings keys (read/write)

The following configuration keys are supported for modifying the touch screen configuration. The channel number can be omitted from the command when requesting or setting the value for these keys.

Table 67 *Supported Touch Screen Settings configuration keys*

Key	Values	Description
touchscreen_backlight	integer(0...255)	Specify the touchscreen backlight level.
touchscreen_enabled	on empty string ("")	Enables or disables the touch screen. To enable the touch screen, set to on. To disable the touch screen, set to an empty string ("").
touchscreen_info	on	Enables or disables system information from the touch

Key	Values	Description
	empty string ("")	screen. To enable system info from the touch screen, set to on. To disable system info from the touch screen, set to an empty string ("").
touchscreen_preview	on empty string ("")	Enables or disables channel preview on the touch screen. To enable preview on the touch screen, set to on. To disable preview on the touch screen, set to an empty string ("").
touchscreen_recordctl	on empty string ("")	Enables or disables recording control from the touch screen. To enable recording from the touch screen, set to on. To disable recording from the touch screen, set to an empty string ("").
touchscreen_settings	on empty string ("")	Enables or disables settings changes from the touch screen. To enable settings changes from the touch screen, set to on. To disable settings changes from the touch screen, set to an empty string ("").
touchscreen_timeout	integer	Specify the time in seconds before the touchsreen times out. For no timeout, use 0.

Recording configuration keys

The following recording settings are supported. Specify the channel or recorder you want to configure.

Table 68 Supported Recording configuration keys

Key	Values	Description
rec_enabled	on empty string ("")	Enables or disables recording. To enable recording, set to on. To disable recording, set to an empty string ("").
rec_format	avi mov mp4 mp4f ts	Specifies the format of the saved file. (mp4 is used for the progressive mp4 file format, mp4f for fragmented)

Key	Values	Description
rec_prefix	string	Specifies a prefix for the recorded filenames.
rec_sizelimit	integer	Specifies the file size limit, in kilobytes (kB).
rec_timelimit	string (no quotes) hh:mm:ss	Specifies the time limit before a new recording file is created. For example, for 3 hour recordings, use 3:00:00
rec_upnp	on off	Specifies whether or not recordings should be available over UPnP.

HTTP server configuration keys

The following settings are supported for configuration of the HTTP server run by Pearl Mini.

Table 69 *Supported HTTP Server configuration keys*

Key	Values	Description
http_port	integer	Specifies the HTTP server port.
http_sport	integer	Specifies the HTTP server SSL port (HTTPS port).
http_usessl	on empty string ("")	Enables or disables HTTPS (SSL Server) To enable SSL, set to on. To disable SSL, set to an empty string ("").

IP-based access control configuration keys

The following settings are supported for configuring allowed and denied IP addresses for Pearl Mini only, not for individual channels. See Restrict viewers by IP address for more information about Allow and Deny lists.

Table 70 *Supported IP-Based Access configuration keys*

Key	Values	Description
allowips	string: comma-separated list of IP addresses and/or ranges. empty string("")	Specifies the IP addresses to permit access. To restrict access, provide a list of permitted IP addresses. To clear allowed IP restriction, set to an empty string ("").
denyips	string: comma-	Specifies the IP addresses to deny access.

Key	Values	Description
	separated list of IP addresses and/or ranges. empty string("")	To restrict access, provide a list of denied IP addresses. To clear denied IP restriction, set to an empty string ("").

UPnP configuration keys

The following settings are supported for UPnP streaming.

Table 71 *Supported UPnP Streaming configuration keys*

Key	Values	Description
share_archive	on empty string ("")	Enables sharing of recorded files via UPnP. To enable sharing files over UPnP, set to on. To disable sharing files over UPnP, set to an empty string ("").
share_livestreams	on empty string ("")	Enables sharing of the live stream via UPnP. To enable stream sharing over UPnP, set to on. To disable stream sharing over UPnP, set to an empty string ("").
server_name	string	Specifies the UPnP server name. To use the system name, set to an empty string ("").

Broadcast configuration keys

The following settings for streaming to viewers (broadcasting) are supported, including stream access control settings.

Table 72 *Supported Broadcast configuration keys*

Key	Values	Description
bcast_disabled	on empty string ("")	Enables or disables the broadcast. To disable broadcast, set to on. To enable broadcast, set to empty string ("").
rtsp_port	1000...65535, but not 5557	Specifies the port for RTSP streaming. Note port 5557 is used for network discovery and cannot be used for streaming.

Key	Values	Description
streamport	1000...65535, but not 5557	Specifies the port used for streaming. Note port 5557 is used for network discovery and cannot be used for streaming.
ac_override	on empty string ("")	Overrides the global stream access settings or uses global stream access settings. To use global stream access settings, set to empty string (""). To override global stream access settings and use local viewer access permtions, set to on.
ac_viewerpwd	string	Specifies the password for Viewers.
ac_allowips	integer	Displays a list of the allowed IP addresses for live streams
ac_denyips	integer	Displays a list of the denied IP addresses for live streams

Channel encoder configuration keys

The following encoder settings are supported for each channel. For more information on individual items listed, see Configure channel encoding.

Table 73 *Supported channel encoder configuration keys*

Key	Values	Description
autoframesize	on empty string ("")	Enables or disables use of the current signal's resolution as the frame size. Is switched to off if a frame size is manually specified. To use current signal's frame size, set to on. To specify frame size directly, set to empty string ("").
codec	h.264 mjpeg	Specifies the stream codec.
fpslimit	1-60	Specifies the frame per second limit. Set to your desired limit.
framesize	wxh for example: 640x480, 720x400, 1024x768, 1920x1080	Specifies the frame (width by height) size in pixels. Set to desired size. Choose from the list in the UI or set a custom value of your choosing up to the maximum output resoultion supported by Pearl Mini

Key	Values	Description
slicemode	on empty string ("")	Enables or disables H.264 slicing for RTP. To enable slicing, set to on. To disable slicing, set to empty string ("").
vbitrate	Integer	Gets or changes the video bit rate in kbps.
vbufmode	1 (low delay) 2 (storage)	Specifies the broadcast compression level. For low delay when streaming, specify 1. For best results or recording, set to 2.
vencpreset	0 (Software) 5 (Hardware Accelerated)	Specifies a video encoding preset. For software, set to 0. For hardware acceleration (recommended), set to 5
vkeyframeinterval	integer	Interval time in seconds between key frames in the encoded stream.
vprofile	66 77 100	Specifies the h.264 video profiles. For Baseline profile, select 66. For Main profile, select 77. For High profile, select 100.
qvalue	0...100	Specifies quality for M-JPEG videos.

Channel layout configuration keys

To work with layouts, you need to know the integer identifier of the layout. To find your layout's identifier, select the layout using the Admin panel and look for the identifier in the browser's url.
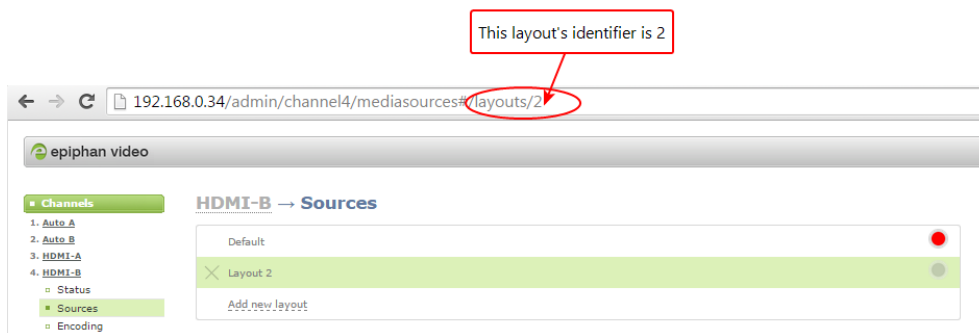
Table 74 *Supported channel layout configuration keys*

Key	Values	Description
active_layout	integer	Specifies which layout is currently active for the specified channel.

Audio configuration keys

The following audio configuration keys are supported. For more information on individual items listed, see Configure channel encoding.

Table 75 *Supported Audio configuration keys*

Key	Values	Description
audio	on empty string ("")	Enables or disables audio for the stream. To enable audio, set to on. To disable audio, set to an empty string ("").
audiobitrate	32 64 96 112 128 160 192	Specifies the audio bitrate for the stream. Not applicable for PCM audio codecs.
audiochannels	1 (mono) 2 (stereo)	Specifies the number of audio channels. For mono, set to 1. For stereo, set to 2.
audiopreset	CODECS: pcm_s161e (PCM) libmp3lame (MP3) libfacc (AAC) RATES: 16000 (AAC only) 22050 44100 48000	Specifies an audio code preset in the format CODEC;RATE. i.e. libfaac;22050

Stream publishing configuration keys

The system supports the following stream publishing settings. For more information on publishing the stream, see What is streaming?.

Table 76 *Supported Stream Publishing configuration keys*

Key	Values	Description
publish_enabled	on off / any other value	Starts or stops streaming to CDN servers (RTSP, RTMP type streaming including Original Livestream and Wowza Cloud). See Stream to a CDN. To turn streaming on, set to on. To turn streaming off, set to off or to any other value.
publish_type	0 (do not publish) 2 (RTSP Announce) 3 (multicast RTP/UDP) 4 (multicast MPEG-TS over UDP) 5 (multicast MPEG-TS over RTP/UDP) 6 (RTMP push) 7 (Wowza Streaming Cloud) 8 (Original Livestream)	Specifies the type of stream publishing, if any.

RTP/UDP configuration keys (Publish type 3)

The following settings are supported when the publish type is set to RTP/UDP. For more information on RTP/UDP and these settings, see What is streaming?.

Table 77 *Supported RTP/UDP configuration keys*

Key	Values	Description
unicast_address	string (IP address)	Specifies the unicast/multicast address.
unicast_aport	1000…65535, but not 5557	Specifies the UDP port for RTP/UDP audio streaming. Note port 5557 is used for network discovery and cannot be used for streaming.

Key	Values	Description
unicast_vport	1000...65535, but not 5557	Specifies the UDP port for RTP/UDP video streaming. Note port 5557 is used for network discovery and cannot be used for streaming.

MPEG-TS configuration keys (Publish types 4 and 5)

The following settings are supported when the publish type is set to MPEG-TS and for associated SAP distribution. For more information on MPEG-TS and these settings, see What is streaming?Viewing with Session Announcement Protocol (SAP).

Table 78 *Supported MPEG-TS and SAP configuration keys*

Key	Values	Description
unicast_address	string (IP address)	Specifies the unicast/multicast address.
unicast_mport	1000...65535, but not 5557	Specifies the UDP port for MPEG-TS streaming. Note port 5557 is used for network discovery and cannot be used for streaming.
sap	on empty string ("")	Enables sharing of recorded files via SAP. To enable sharing files over SAP, set to on. To disable sharing files over SAP, set to an empty string ("").
sap_channel_no	integer	Specifies the SAP channel number.
sap_group	string	Specifies the SAP group name.
sap_ip	string	Specify the SAP annoucement IP.

RTMP push configuration keys (Publish type 6 and 7)

The following settings are supported when the publish type is set to RTMP Push. For more information on RTMP and these settings, see Set up a stream using RTMP push and What is streaming?.

Table 79 *Supported RTMP Push Configuration Keys*

Key	Values	Description
rtmp_url	string	Specifies the RTMP server URL.

Key	Values	Description
rtmp_stream	string	Specifies the RTMP stream name, as configured with the CDN.
rtmp_username	string	Specifies the username for the RTMP server.
rtmp_password	string	Specifies the password for the RTMP server.

Livestream configuration keys (Publish type 8)

The following settings are supported when the publish type is set to Original Livestream. For more information on these settings, see Stream to Original Livestream What is streaming?.

Table 80 *Supported Livestream configuration Keys*

Key	Values	Description
livestream_channel	string	The channel name, configured at the Livestream server.
rtmp_username	string	Specifies the username for the Livestream server.
rtmp_password	string	Specifies the password for the Livestream server.

Content metadata configuration keys

The following keys are available for configuration of the content's metadata.

Table 81 *Supported Content Metadata Configuration Keys*

Key	Values	Description
author	string	Specifies the name of the author for the stream/recording. Refer to description above on handling white space (spaces) in the string.
comment	string	Specifies a comment for the stream/recording. Refer to description above on handling white space (spaces) in the string.
copyright	string	Specifies the copyright for the streaming/recording. Refer to description above on handling white space (spaces) in the string.
title	string	Specifies the title for the stream/recording. Refer to description

Key	Values	Description
		above on handling white space (spaces) in the string. (This string can be displayed by certain viewing applications by looking at the stream's metadata information.)

Troubleshooting

In addition to fine tuning channel settings such as frame rate, resolution and bit rate to ensure optimal use of resources while streaming a quality video, there may be circumstance when you must fine tune the video input source.

> It's good practice to backup your configuration settings so that you can revert back to a good configuration if the changes you made are not desirable, see **Configuration presets**.

Topics include:

- Troubleshooting Quick Reference
- Remove black bars (matte) from the video
- Use a specific EDID for the video input port
- Unstretch the output video
- Remove the combing effect on images

Troubleshooting Quick Reference

Use the follow quick reference table for help if you are experiencing problems or unexpected behavior from your Pearl Mini.

Table 82 *Troubleshooting Quick Reference*

Problem	Action(s) to Resolve
Not sure if the connected video inputs are being captured.	Check each source's input from the source preview in the Admin panel. OR Check the touchscreen interface to view confidence monitoring for each channel, see About the touch screen. OR Check the Dashboard interface in Epiphan Live, see Monitor video and audio input sources.
No sound is coming from an audio source.	Verify that you are using the correct audio input by following the steps in Configure channel encoding. OR Check the audio meter from the Dashboard view in Epiphan Live, see Monitor video and audio input sources. OR Check the touchscreen interface for audio monitoring or use the 3.5 mm audio jack on the front of Pearl Mini to verify audio, see About the touch screen.
Captured SDI audio contains audible "clicking" sound or other audio distortions upon playback.	Ensure audio sample rate is set to 48 kHz. Lower sample rates (i.e. 32 kHz and 44 kHz) can sometimes cause audio distortion.
When previewing a channel using the Live broadcast link or the preview link in the Admin panel, some web browsers do not play audio.	Some web browsers do not play audio if PCM is the configured audio encoding for the channel. Choose a different audio codec for the channel or use a media player to preview the channel. Web browsers that use Flash players to preview video do not support audio that's encoded using 48 kHz MP3 or 48 kHz PCM.

Problem	Action(s) to Resolve
Too much noise is present in the audio output.	Check the input level of the audio source to make sure it's the correct level, see Selecting an audio source. Modify the input **gain** if necessary, see Adjust audio gain and delay.
Video playback is fine, but when I play the clip in Adobe Premiere Pro the audio and video are out of sync.	Adobe Premiere Pro has a known issue handling video that is recorded using a variable frame rate. Convert the clip to a constant frame rate using a third-party software, such as Handbrake, before editing in Adobe Premiere Pro.
Adobe Premiere Pro won't load my .mp4 recording from Pearl Mini.	Check if the selected recording format in Pearl Mini is MP4-Fragmented. Adobe Premiere Pro does not currently support fragmented .mp4 files. Before editing in Adobe Premiere Pro, convert the clip to progressive .mp4 format. Run the file through ffmpeg or a third-party software such as Handbrake to preserve both audio and video output.
I can't preview my channels using the Epiphan Live Dashboard on Chrome even after I updated the security certificate for my website	If you're using the Chrome browser on an HTTPs network and your website has an insecure or invalid security certificate, you can't preview any Pearl Mini channels using the Dashboard even after updating the security certificate in Chrome. Use a different web browser, such as Firefox, and add the security certificate for the website to the exceptions list.
Image quality is poor or insufficient.	The following tips can help improve image quality: 1. Ensure the source resolution is used as the output or recorded resolution. Up-scaling and down-scaling can affect picture quality. 2. Increase the **Bitrate** value and/or decrease the **Limit frame rate** value in the Encoding menu. See Configure channel encoding.
Frames per second are lower than expected.	The following tips can help improve frames per second (fps): 1. Increase **the Limit frame rate** value and/or decrease the **Bitrate** value in the Encoding menu. See Configure channel encoding. 2. Reduce the number of actions happening simultaneously on the system (i.e. if streaming, recording, and copying files, consider waiting to copy files until after streaming and recording are complete).

Problem	Action(s) to Resolve
	3. Enter a low negative value (i.e. -5) in the Frame Grabber's Vertical Shift field.
	4. Reduce the number of channels encoding data.
Stream won't play in my media player or browser.	Verify that the Stream Type matches with the media player used and that you have the correct url or SDP file for the player. See Stream content using HTTP or RTSP and Stream to a media player or smart TV.
	If you still cannot see the stream, try disabling your local computer firewall.
	If the issue is still not resolved, contact Epiphan Support at support@epiphan.com.
The stream interrupts or the image breaks up.	The following tips can help diagnose image problems:
	1. Ensure the source resolution is used as the output or recorded resolution. Up-scaling and down-scaling can affect picture quality. See Configure channel encoding.
	2. Increase the **Bitrate** value and/or decrease the **Limit frame rate** value in the Encoding menu. See Configure channel encoding.
	3. Check network settings including filters, routers and application settings. Packet loss can result in stream failure.
Recording issues.	If recording will not start, check the Disk Status Information to see if the system is out of disk space. See Storage space maintenance and Manage recorded files.
Firmware upgrade fails.	Reboot the system and try again. If the problem persists, contact Epiphan support at support@epiphan.com.
Certain Media players won't play encoded videos but others will.	Depending on the media player used, there could be different issues, including:
	1. On Windows 10, the Movies & TV app sometimes fails to playback MP4-fragmented files with MP3 audio: try changing your MP4 audio encoding to AAC.
	2. Streams and recordings at very low frame rates (e.g. 1

Problem	Action(s) to Resolve
	fps) are not playable in VLC media player, use Windows Media Player and Quicktime Player instead.
Certain Media players won't play MOV videos.	Some media players won't play MOV videos that are recorded with MP3 audio encoding, including: 1. VLC 2.2.4 (Microsoft Windows) if MP3 audio encoding is at 48 kbps. 2. Movies & TV 10.16122.1029 on Windows 10. 3. Windows Media Player 12. Choose a different audio encoding when recording MOV files or use a different media player to playback the recording.
System is not starting up correctly	Ensure there are no USB sticks inserted into the USB ports during power up. They may be conflicting with the internal hard drive, causing unexpected behavior.

Remove black bars (matte) from the video

Channels with only one layout and only one source by default use the aspect ratio of input signals when the output is streamed. If an input video signal doesn't match the encoded frame aspect ratio, bars are added to the sides or top and bottom of the encoded stream when the output is streamed and recorded.

If you see bars on your output but would rather have the image fill the whole screen, you have to options:

1. Change the output frame size to match the aspect ratio of the input, see Match output frame size with aspect ratio of input signal.

2. Stretch the image to fit the output frame size aspect ratio, see Stretch the image.

The color of the bars (matte) is defined by the Background color that is selected using the custom layout editor for the channel, see Custom layout configuration.

> For example:
>
> - Input signal resolution is 720×480 (a 3:2 aspect ratio)
>
> - encoded resolution is 640×480 (a 4:3 aspect ratio that is narrower than the input resolution)
>
> Borders are added to the top and bottom of the image to preserve the wider ratio of the input.

For example:

- Input signal resolution is 720×480 (a 3:2 aspect ratio)

- encoded resolution is 1280×800 (a 16:10 aspect ratio that is wider than the input resolution)

Borders are added to the left and right of the image to preserve the narrower ratio of the input.

Match output frame size with aspect ratio of input signal

The frame size is matched only for layouts that have only one source. Note that if you have layouts with different frame sizes, switching them while live streaming will cause an interruption and restart of the stream. The same thing happens if you change the resolution of your source while streaming.

To change the output frame size on channels to match the aspect ratio of the video source:

1. Connect to the Admin panel and login as **admin**, see Connect to the Admin panel.

2. To determine the input port name of the video source that's used in the channel, select the channel from the Channels menu and click **Layouts**. The custom layouts page opens.

3. Once you have determined the name of the video input source , select the input port for that video source under Inputs menu.

4. Make note of the input signal resolution.

5. From the Channel's menu, click **Encoding** for the channel. The Encoding page opens.

6. You can either check **Use current signal resolution as frame size** or you can choose the frame size resolution from the list.
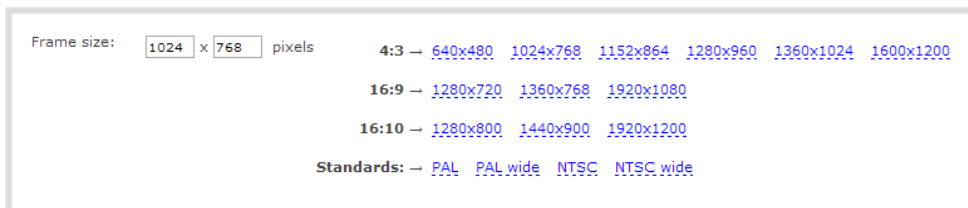
a. If the source resolution appears in the list, you can choose any resolution that's listed on the same line (i.e. with the same aspect ratio).

b. If the source resolution doesn't appear in the list, calculate the source resolution and enter it in the **Frame size** fields.

> **TIP**: Temporarily check **Use current signal resolution as frame size** to see the frame size listed in the Frame size fields, then uncheck that check box and manually enter the value in the **Frame size** fields.

7. Click **Apply**.

Stretch the image

You can remove the matte (black bars) by stretching the image to fit your output frame size using the custom layout editor.

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Channels menu, select the channel and click **Layouts**. The custom layout editor page opens.

3. In the layouts list, select the row for the layout you want.

4. In the items list below the layout editing area, select the video source. The video source settings appear.

5. Uncheck **Keep aspect ratio when scaling**.

6. In the layout editing area, click and drag to stretch the video source to fill the frame.

7. Click **Save**.

Use a specific EDID for the video input port

Extended display identification data (EDID) is data provided by a video display device, like a monitor. The EDID describes the display's capabilities to a video source, such as the graphics card in a PC or other video output device.

In Pearl Mini, the video source uses the EDID information to determine what resolutions, color depth, and other settings the monitor supports.

The video input ports on Pearl Mini have a factory set EDID. When you connect a video source such as a laptop or camera to Pearl Mini, the video source sees Pearl Mini as if it were a monitor. The EDID that's assigned to the input port is read by the video source to determine what video signal it needs to send to Pearl Mini.

Usually, the video input ports on Pearl Mini correctly emulate a monitor for the connected video source. However, there are times when you may need to upload a custom EDID, like when your source uses a custom set of display properties.

When you upload a custom EDID to an input port on Pearl Mini, you can force the port to supply a specific resolution, color depth, etc to the connected video source.

Upload a new EDID

In most cases, the factory installed default EDID works fine for sources connected to the HDMI ports on Pearl Mini. However, there may be times when a connected video source uses resolutions that you do not want to use. In that case, you can manually upload an EDID and force Pearl Mini to use a specific set of attributes for a specific HDMI input port. All video sources you connect to that HDMI input port will use the EDID you've manually assigned to the port.

> 🛑 **STOP** EDID changes remain in effect for the HDMI input port until you replace the EDID with another one or specifically choose to restore the factory EDID for that specific HDMI input port. A system-level factory reset does not remove a manually assigned EDID from the HDMI port.

1. To download a new EDID file, go to the Epiphan support web page and select the support page for Pearl Mini.

2. Scroll to the **EDID** section and select an EDID from the list. The file is saved to your downloads folder on your hard drive.

3. Connect to the Admin panel and log in as **admin**. See Connect to the Admin panel

4. From the Inputs menu, select the input port for which you want to upload the EDID.

5. On the configuration page for that source, scroll to the **EDID upload** section and click **Choose FIle**.
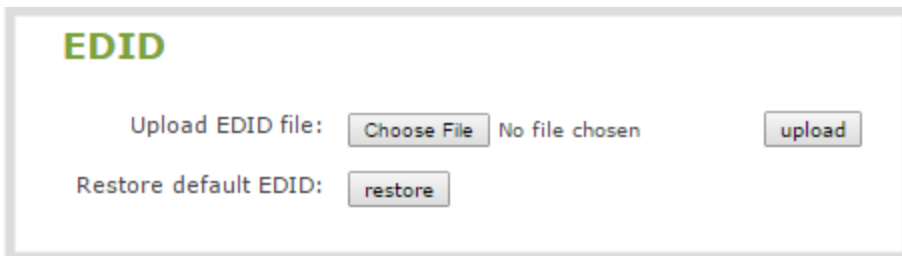
6. Browse to the location where the custom EDID file was saved and select it, then click **open**.

7. Click **upload**. When the upload is complete, the page updates to reflect success or failure.
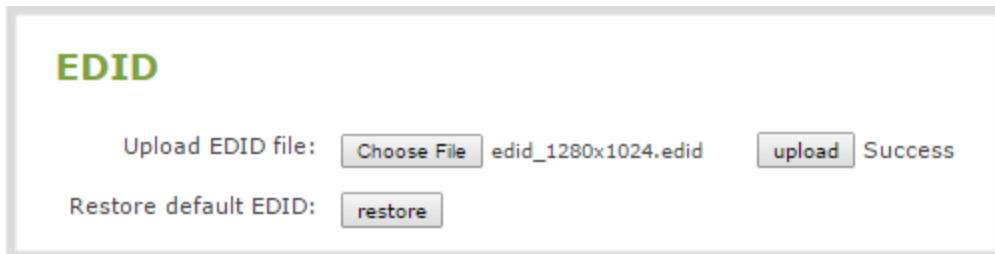
Restore factory default EDID

When you no longer want a custom EDID assigned to an input port, you can restore the input port to use the factory default EDID. Currently there is no way to tell if your input port is using a custom EDID. If you are unsure, restoring to factory default is the best approach.

To restore the default EDID:.

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. From the Inputs menu, select the source you want to restore. The source configuration page opens.

3. Scroll to the **EDID** section and click **restore**.
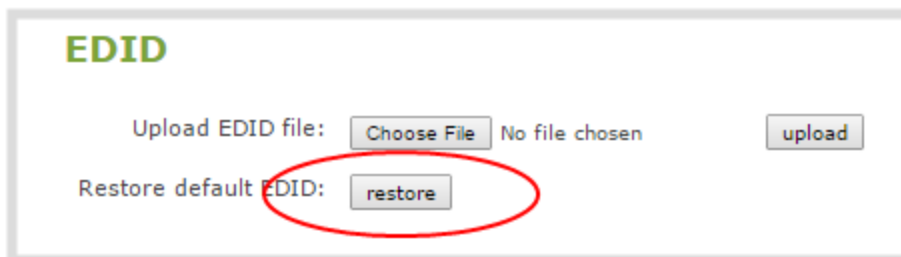
4. When the default EDID is applied, the page updates to reflect success or failure.
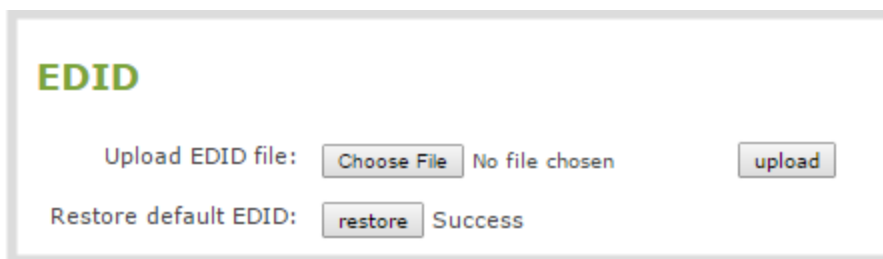
Unstretch the output video

Pearl Mini preserves the aspect ratio of your input video signal by default when you add the source to a layout using the custom layout editor. If you've changed the default setting, the image is stretched to match the output frame size.

To prevent the image from looking stretched, you can use the custom layout editor to preserve the video source's aspect ratio.

> Unstretching the image causes a matte (black bars) to appear on the sides or top and bottom of the output. To remove these see **Remove black bars (matte) from the video**.

To preserve the video source's aspect ratio:

1. Connect to the Admin panel and login as **admin**. See Connect to the Admin panel.

2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor page opens.

3. In the layouts list, select the row for the layout you want.

4. In the items list below the layout editing area, select the video source. The video source settings appear.

5. Check **Keep aspect ratio when scaling** and click **Save**.

Remove the combing effect on images

When frames are interlaced, artifacts from one frame may appear on the next frame. This happens when a fast motion video is interlaced.

Since each frame is captured from a different point in time, the action captured in one frame is carried over to the next frame. The result is a blurred image and horizontal lines running across the video.

To convert an interlaced source signal to a non-interlaced signal.

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

3. From the Inputs menu, click the source name. The configuration page for the source opens.
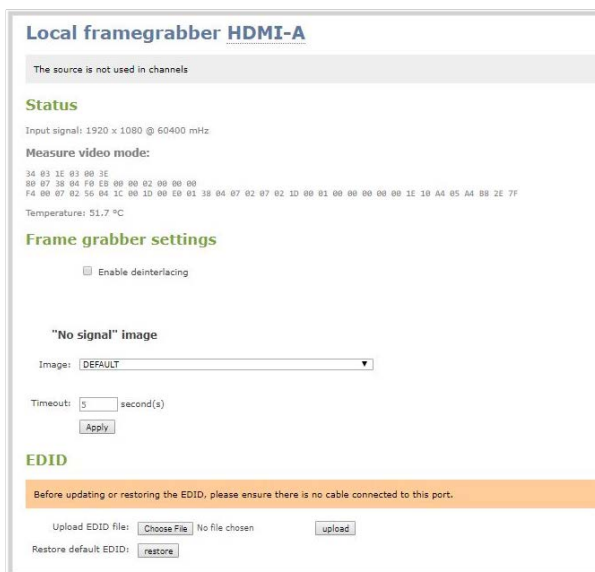
4. Check **Enable deinterlace** and click **Apply**.

Limitations and known issues

This section includes known issues or limitations that affect functionality or usability and ways that you can work around these limitations.

Affecting encoding

- **Limitation**: When Pearl Mini is overloaded, video frames or audio samples can be dropped causing variable frame rate and audio cracks.
  Workaround: Pearl Mini is a powerful system capable of many simultaneous tasks, but like any other computing device, it has finite resources. If this problem is observed, check the CPU load from your system's Info page.
  To reduce system load, do any of the following: disconnect unused video displays from Pearl Mini's video output ports, delete unused channels and unused layouts, or reduce the complexity of layouts by scaling at the source instead of having the system scale, or reduce the number of sources in layouts, or reduce the frame size or frame rate for channels displayed on the video output ports. Note that actions performed in the Admin panel and Epiphan Live can increase overhead (such as adding channels/sources to Epiphan Live's Dashboard preview panels), as can switching layouts via Pearl Mini's touch screen.

- Encoding video at 60 fps with either 16 kHz or 22 kHz AAC audio can result in some dropped video frames.
  Workaround: Select another video frame rate, a different audio sampling rate, or choose MP3 audio.

- Configuring very low frame rates such as 1 fps encoding with a high bitrate setting (e.g. 7000 kbps) results in poor video quality.
  Workaround: Allow Pearl Mini to automatically select the best bitrate setting. For 1 fps, this results in a bitrate of about 1180 kbps.

- Some audio distortion is heard on video output port using PCM 22 kHz encoding or very low frame rate (1-5 fps).
  Workaround: For best results, use AAC 48 kHz or PCM 48 kHz audio encoding and encode the channel at higher than 5 frames per second.

Affecting streaming and recording

- Streaming status on the touch screen does not include Wowza Streaming Cloud transcoder settings.
  Workaround: Start the transcoder from the Pearl Mini or Wowza web UI.

- Extracting tracks from an .MP4 recording when there isn't enough storage space for the extracted files causes the extracted files to become corrupted.
  Workaround: Check how much internal storage space is available on Pearl Mini and delete any unnecessary recordings to free up more space.

- Occasionally, tracks won't extract from a 64 GB .AVI multi-track recording using the Admin UI.
  Workaround: Perform the extraction again.

- When previewing a channel using the Live broadcast link or the preview link in the Admin panel, some web browsers do not play audio if PCM encoding is the configured audio codec for the channel.
  Workaround: Choose a different audio encoding for the channel.

Affecting the Admin panel

- Passwords and IP restrictions set for viewers don't restrict access when using certain common platforms or when set on a per-channel basis if your stream uses HTTP Live Streaming (HLS) because HLS is processed directly by the apache server.
  Workaround: This only applies if you're using a password for the stream. The only common platforms where this is a know issue are VLC and iPhone6, iOS 10.0.1, and using another platform prevents the issue. If you're streaming over HLS, do not set viewer passwords and IP restrictions per-channel. Use global viewer passwords and IP allow/deny lists instead.

- It is possible to name two or more channels with the same value. Use of automatic file transfer and UPnP is unpredictable if this occurs.
  Workaround: Ensure each channel has a unique name.

- The automatic file upload (AFU) file queue shows a maximum of 15 files, Newer 15 and Top of the list buttons do not work. All files are transfered, even though they are not listed.
  Workaround: Wait for the queue to have fewer files in the list. Use global viewer passwords and IP allow/deny lists instead.

- Cropping a video source to 16:9 using the layout editor may not scale correctly and can appear as a thin line in the layout editor. This happens when the device or web browser you're using with the admin interface has a different approach to composing layout. Recording and streaming are not affected.
  Workaround: Due to color space limitations (YUV with 2x2 subsampling), the cropped region's dimensions must be set to even values.

- Authentication to Pearl Mini using DNS login will often fail for Windows Edge, and on Mac OS X 10.10 with Safari, Chrome, and Firefox.
  Workaround: Use a different web browser such as Chrome or Internet Explorer, or use a different OS.

- When streaming to the Wowza streaming cloud, the Transcoder state field always displays a status of "starting" even after the stream has started.

- The special preview mode that lets you preview all channels at once using a web browser isn't functioning.
  Workaround: Preview individual channels using different tabs in your web browser.

Affecting Epiphan Live

- Very fast, repeated switching between layouts using the Switcher interface can sometimes cause the monitoring panels and the preview in the Admin Panel to display an blank screen until the video image finishes loading.
  Workaround: Avoid repeated fast switching between layouts.

- Streaming status on the Epiphan Live Dashboard interface and touch screen does not include information regarding Wowza Streaming Cloud transcoder settings.
  Workaround: When streaming to Wowza, ensure the transcoder in the Wowza Streaming Cloud web interface is enabled.

- The green and red borders around the "Preview" and "Live" areas in the Channel section are offset from the video by a few pixels.
  Workaround: The offset is cosmetic and does not affect your Live stream, so no workaround is required.

- When a HDMI output assigned to a Dashboard preview panel has its source changed, the preview panel does not automatically update to reflect the change.
  Workaround: Refresh the Epiphan Live Dashboard in your web browser to update any changes in your preview panels.

Affecting other areas

- AFU to Amazon Web Services S3 Simple Cloud Storage transfer sometimes does not recover after the network connection is cut. The expected behavior is that the file transfer would restart, but there is sometimes a time desync that results in a failed transfer.
  Workaround: If the network connection is severed during a AFU transfer, the process must be restarted from the beginning, and the transfer must proceed without interruptions to the network.

- Pearl Mini doesn't synchronize time from a local Windows NTP server.
  Workaround: Avoid using a local Windows NTP server with Pearl Mini.

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June 20, 2018

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Important Safety Warnings

WARNING: This product has no user-serviceable parts and the battery used in this device is not replaceable. Do not attempt to disassemble. Return the device for service.

CAUTION, RISK OF ELECTRIC SHOCK: This device may have multiple AC power cords installed. All power sources shall be disconnected before servicing to avoid shock hazard.

ATTENTION: Cet appareil ne contient aucun composant pouvant être entretenu ou réparé par l'utilisateur. En cas de panne, retourner l'appareil pour réparation.

ATTENTION, RISQUE DE CHOC ÉLECTRIQUE: Cet appareil peut être équipé de multiples cordons d'alimentation en courant alternatif. Pour placer cet appareil hors tension, débrancher tous les cordons d'alimentation sans exception.

FCC & CE Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference

2. This device must accept any interference received, including interference that may cause undesired operation.

Marking by the symbol $C\epsilon$ indicates compliance of this device with EMC directive of the European Community and meets or exceeds the following technical standard.

EN 55022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.

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