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User Guide

Epiphan Pearl-2
Pearl-2 Rackmount
Pearl-2 Rackmount Twin

Release 4.5.1
August 15, 2018

UG115-10

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Technical support

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- 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

What's new in release 4.5.1?

Firmware 4.5.1 adds some exciting improvements to how audio works on Pearl-2 and new features like remote login access, which integrates with AV Studio to expand your live video production possibilities. Plus more feature enhancements in this latest firmware update.

Firmware 4.5.1

Constant volume for layouts with multiple audio sources

Now you can add multiple audio sources to the same layout and the audio level of the inputs remains constant. The volume no longer decreases as more audio sources are added to the layout. However, if audio sources in the same layout have the exact same audio signals, like from the same audio track, the common audio signals are amplified.

Stereo and mono analog audio selection

You can now configure the four XLR audio inputs to operate as separate mono inputs. They are configured as two stereo pairs by default: XLR A (left/right) and XLR B (left/right).

Assign XLR B/RCA audio sources to an input

The XLR B audio ports and the RCA audio ports are internally linked. You can now use the Admin panel to configure the Analog-B audio input to have both audio sources or you can choose just one and disable the other one.

Mute audio

You can now mute audio inputs using the Admin panel.

Remote login

Perform remote rescue troubleshooting, channel configuration, and more when you pair your Pearl-2 channels with your free AV Studio account. Get secure access to the web versions of the Admin panel or Epiphan Live from AV Studio, control recording, and even do things like check the channel status on Pearl-2 and make some channel encoding settings directly from AV Studio.

Channel as a source

We've made it easy to take the output from one channel and use that as the input for another channel. This way, you can set up your switched program in the first channel and duplicate that exact content in the second channel.

Mirror the video output

Now you can flip the video on the video output port so that a mirrored image is displayed on the confidence monitor you connect to the video output port.

Important UI terms changed

In the Channel menu, the option to select the custom layout editor changed from **Sources** to **Layouts**, and the **Branding** menu option changed to **Metadata**.

In the Configuration menu, the **Branding** option changed to **Media**.

We also renamed the **Sources** menu to **Inputs**.

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Start here

Welcome, and thank you for buying Epiphan Pearl-2™, Pearl-2 Rackmount™ or Pearl-2 Rackmount Twin™. You'll find information on how to set up and use all three models in this user guide. When you see the name Pearl-2 used in this guide, it means that the content applies to all three models. Differences are explicitly called out. For a product description, see What is Pearl-2?.

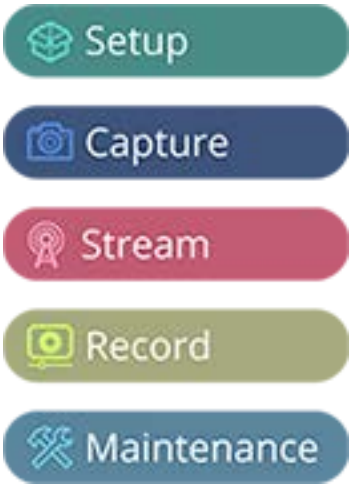
See the Quick start for basic steps to get a single video source (and optional audio) set up so you can stream and record some output right away. The rest of the guide shows you how to tweak the system exactly how you want it so you can take advantage of the many advanced features.

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-2. 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.



This guide assumes that all feature add-ons for Pearl-2 are activated. If a documented feature or task is only available when a specific feature add-on is activated, it is indicated by a link to the activation page for that feature add-on. For the 4K add-on, the link is 4K .

What is Pearl-2?

Pearl-2 is a versatile live video production device that's a video encoder, video streamer, live switcher, and video recorder all in one. Pearl-2 comes in three models.

Pearl-2

A small, silent, portable system that comes with a hard-shell carry case.

Pearl-2 Rackmount

A 2U rackmount system with all the same functionality as the portable Pearl-2, but designed for installation and operation in a rack.

Pearl-2 Rackmount Twin

A high density 2U rack mount variation that contains two complete (and independent) Pearl-2 systems.

With Pearl-2, you can capture, record, and stream from computer monitors, radar displays, or almost anything that outputs to SDI, HDMI™, USB, HDMI 4K4K or DVI-I (single link). Capture audio from XLR, RCA,, USB, SDI or HDMI sources.

Simultaneously capture up to six full HD video sources or up to four 4K sources if you have the 4K feature add on installed. You can create up to five simultaneous channels for live switching, or a single 4K channel. Have separate ISOs or create custom layouts with multiple video sources and picture in picture. You can do all that with Pearl-2.

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-2 or using Content Distribution Networks (CDNs). Recorded files can be downloaded via FTP or set to automatically upload via FTP, RSYNC, or CIFS and can be integrated into your Content Management System (CMS).

Pearl-2 does not capture from HDCP encrypted sources.

Feature add-ons

Pearl-2 offers add-on features so you can do even more with your system. Start from the base model of Pearl-2 and add feature add-ons for extra functionality.

See Add-ons overview for details about the availability of add-ons for your system, as well as instructions to purchase and install add-ons.

Where you see this symbol 4K in the guide, that means the feature or function applies only if you have activated the 4K feature add-on.

Front and back view Pearl-2

Table 1 *Pearl-2 front panel descriptions*

Label	Name	Description
1	Touch screen front panel display	Used for confidence monitoring and simple configuration, obtaining system information, and starting/stopping recordings and streams.
2	USB 3.0 port	For connection of external hard drives, flash drives or control interfaces, see AFU or copy to USB. Web cameras cannot be connected to this port, only the ports on the rear.
3	3.5 mm audio jack	For audio confidence monitoring. Plays the audio for the currently visible channel.
4	Power button	Press once to power on. Double-press to initiate a graceful system shutdown.

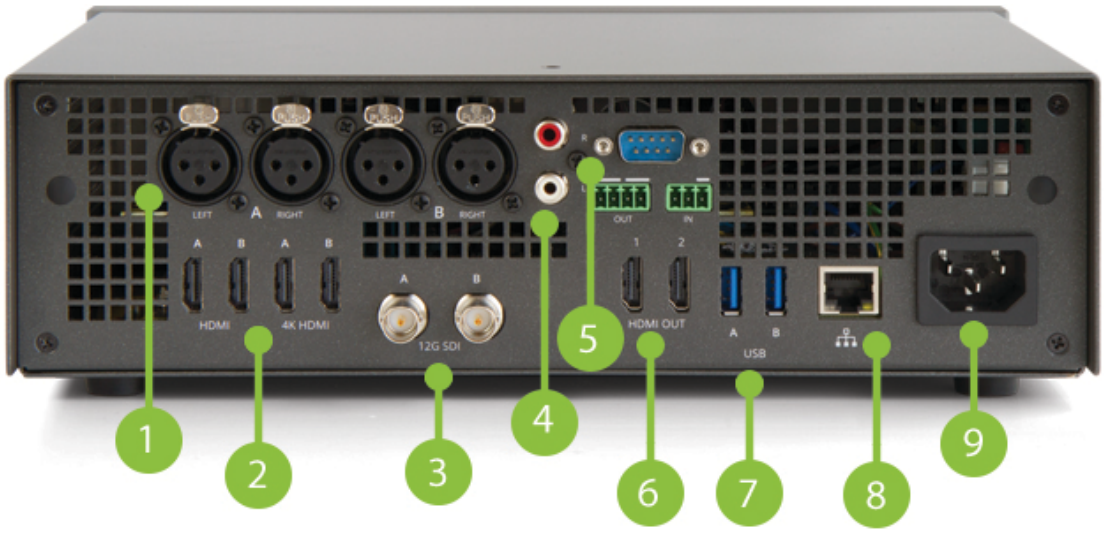


Table 2 *Pearl-2 back panel descriptions*

Label	Name	Description
1	XLR audio in	The four XLR ports can function as two, professional line level left/right stereo pairs (XLR A pair and XLR B pair) or as four mono inputs, see AV inputs. The XLR ports are professional line-level inputs and are calibrated for + 4.0 dBu signals.
2	HDMI in	Four HDMI 1.4 ports that connect HDMI and DVI signals to Pearl-2. The first two ports allow for any signal up to full HD, and the second two inputs allow for any input resolution up to 4K[4K] .
3	12G SDI in	Connects SDI signals to Pearl-2, including 3G-SDI; 6G-SDI; 12G-SDI; 4K-SDI; HD-SDI; SD-SDI
4	RCA audio in	The RCA ports are consumer line level, left/right stereo pair and are calibrated for - 10 dBV signals.
5	RS-232 port	For connection to a control computer terminal.
6	HDMI output ports	HDMI output for connection to a display or projector (up to 4K[1]). Port 1 is HDMI 2.0, and Port 2 is HDMI 1.4, see Video output ports.
7	USB 3.0 ports	For connection of external hard drives, flash drives, USB webcameras, USB microphones or control interfaces, see AFU or copy to USB.

Label	Name	Description
8	RJ-45 Ethernet	Auto-sensing gigabit Ethernet 10/100/1000 Base-T network port. See Configure network settings for setup instructions.
9	Power jack	Plug the supplied 120/240 V AC power cable in here.

[1]Requires 4K feature add on

The SDI ports on the back of Pearl-2 can be delicate. Be careful to avoid sharp impacts or pressure such as balancing the system on its back with the SDI ports against a hard surface. Rough treatment of the SDI ports could result in loss of functionality for that port.

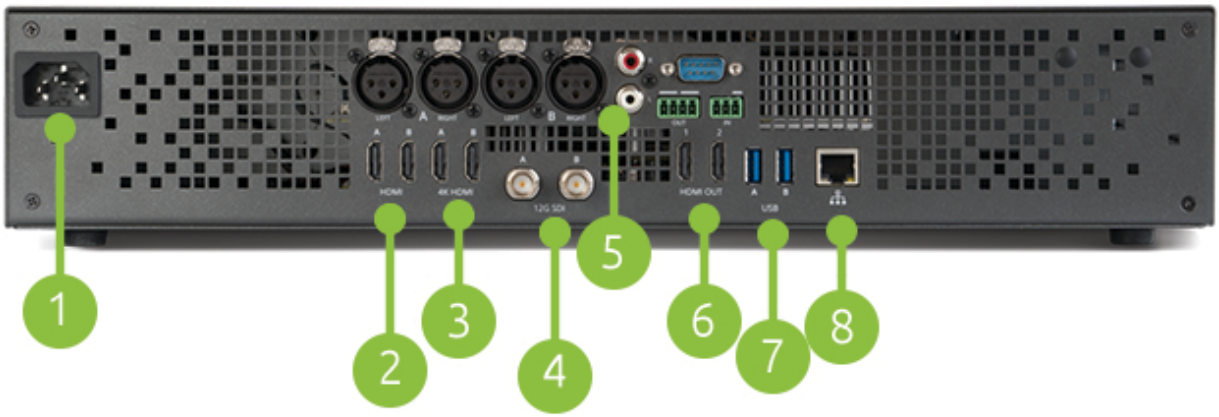
Pearl-2 Rackmount and Pearl-2 Rackmount Twin

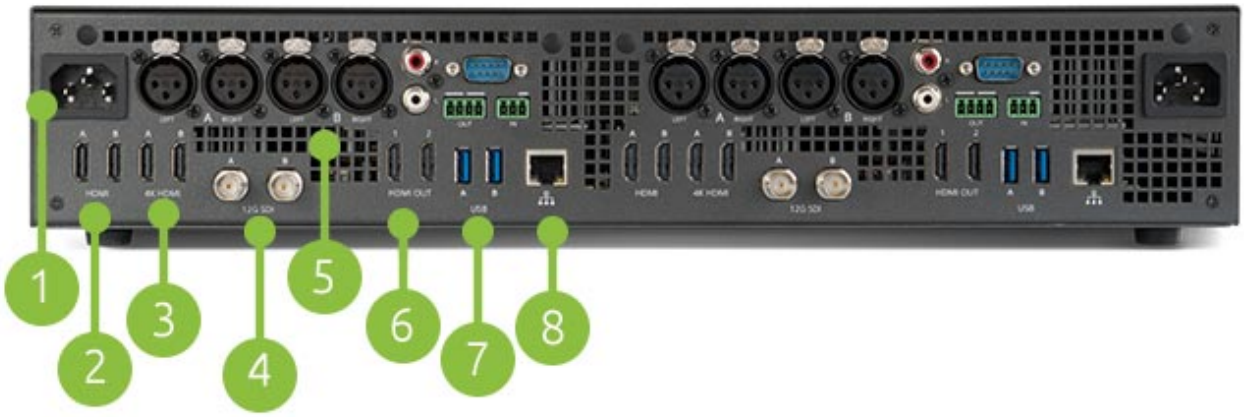
Pearl-2 Rackmount Twin consists of two completely independent Pearl-2 systems, each with identical sets of controls and ports.

Table 3 *Pearl-2 Rackmount front panel descriptions*

Label	Name	Description
1	Touch screen front panel display	Used for confidence monitoring and simple configuration, obtaining system information, and starting/stopping recordings and streams.
2	USB 3.0 port	Two other USB ports are located on the back. See Record for information about recording to USB drives. Web cameras cannot be connected to this port, only the ports on the rear.
3	3.5 mm audio jack	For audio confidence monitoring. Plays the audio for the currently visible channel.

Label	Name	Description
4	Power button and LED	Press once to power on. Double-press to initiate a graceful system shutdown.





Pearl-2 Rackmount Twin consists of two completely independent Pearl-2 systems, each with identical sets of controls and ports.

Table 4 *Pearl-2 Rackmount and Pearl-2 Rackmount Twin back panel descriptions*

Label	Name	Description
1	Power jack	Plug the power supply in here. Always use the provided power supply.
2	HDMI in	Connect HDMI and DVI signals.
3	4K HDMI in	Connect up to 4K[1] HDMI signals.
4	SDI in	Connect SDI signals.
5	XLR audio in	The four XLR ports can function as two, professional line level left/right stereo pairs (XLR A pair and XLR B pair) or as four mono inputs, see AV inputs. The XLR ports are professional line-level inputs and are calibrated for + 4.0 dBu signals.
	RCA audio in	The RCA ports are consumer line level, left/right stereo pair and are calibrated for - 10 dBV signals.
6	HDMI Out	For displaying a source or channel on an external display (up to 4K[1]).
7	USB 3.0 ports	For connection of external hard drives, flash drives, USB webcameras, USB microphones or control interfaces. See Record for recording to a USB drive.
8	RJ-45 Ethernet	Auto-sensing gigabit Ethernet 10/100/1000 Base-T network port. See Configure network settings for setup instructions.

[1]Requires 4K feature add on

The SDI ports on the back of Pearl-2 can be delicate. Be careful to avoid sharp impacts or pressure such as balancing the system on its back with the SDI ports against a hard surface. Rough treatment of the SDI ports could result in loss of functionality for that port.

What's in the Box?

Pearl-2

Pearl-2 Rackmount

Pearl-2 Rackmount Twin

The standalone Pearl-2 model is shipped in a hard shell case that you can re-use for storing or moving the system between jobs. Cable storage is located under the custom foam tray that holds Pearl-2 in the case.

Inside the box with your Pearl-2 system, you'll find the power cable and the following items. Pearl-2 Rackmount Twin comes with two sets of cables:

1. One SDI cable (3 feet / 1 meter in length)
2. One HDMI cable (3 feet / 1 meter in length)
3. One HDMI to DVI adapter
4. One Ethernet cable
5. One region-specific power supply cable (6 feet / 1.8 meters in length)

Table 5 *Cables (power cable not shown)*

Image	Name	Description
	SDI cable	Connect SDI sources to the SDI ports (12G-SDI capable).
	HDMI cable	Connect HDMI or DVI (using adapter) sources to the HDMI ports.
	DVI (female) to HDMI (male) adapter	Connect DVI sources to the HDMI port.
	RJ-45 Ethernet cable	Connect Pearl-2 to your network.

Quick start

This quick start uses the default settings where possible so you can quickly start using your Pearl-2. The instructions apply to all Pearl-2 models; however, rackmount installation is not included here, see Rackmount installation.

For the Pearl-2 Rackmount Twin , you cannot plug a source into one system and use it from the other.

Before you start, make sure you have:

- A video source such as a camera or a computer and cables to connect them to Pearl-2. For HDMI, the source must not be HDCP protected.
- An audio source coming from either your SDI , USB videoor HDMI video source (must not be encrypted). Optionally, audio from a different source, such as an audio mixer 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.

Starting up!

Pearl-2 is pre-configured with two plug and play channels: Auto A and Auto B. Auto channels are used for this quick start. They have automatic video sensing, which detects the video signal you connect to the video input ports on Pearl-2.

The first video source you connect while Pearl-2 is powered on is automatically assigned to the Auto channel (either Auto A or Auto B, depending in which row you connect the video source). For example, when you first start Pearl-2, the video sources you connect to the HDMI-A and HDMI-B input ports appear automatically in Auto A and Auto B channels (respectively). If no video source is connected, a standard No Signal screen displays.

With auto channels, audio from the connected SDI, HDMI, or USB video source is automatically applied to the channel without needing any additional configuration. For SDI or HDMI audio, just make sure it's unencrypted.

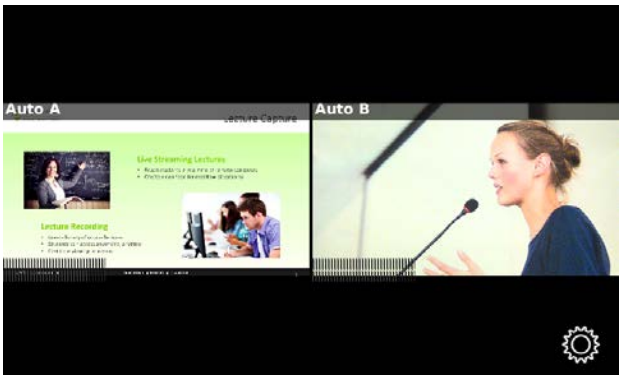
The Auto channel's frame size is set to match the video source by default and the best bit rate for the default frame rate of 30 fps is applied automatically.

For details about Auto channel defaults, behavior, and audio source priorities, see About automatic channels Auto A and Auto B.

To get started quickly with auto channels:

1. Turn on your camera or video source and connect the output to one of the video input ports labeled "A" on the back panel of Pearl-2.
2. (Optional) Connect a second video source to one of the video input ports labeled "B".
3. (Optional) Connect audio to the XLR left/right stereo pair audio input ports on the back of Pearl-2 or to the RCA stereo pair audio input ports.
4. Connect the Ethernet cable to Pearl-2 and to your network.
5. Connect the power cable and plug it into a power source.
6. Press the power button on the front panel to turn on the system. Wait for the power-up cycle to complete.

   The Grid view showing both channels appears on the touch screen. The video source you connected to the "A" row appears in the Auto A channel, and the video source connected to the "B" row appears in the Auto B channel.

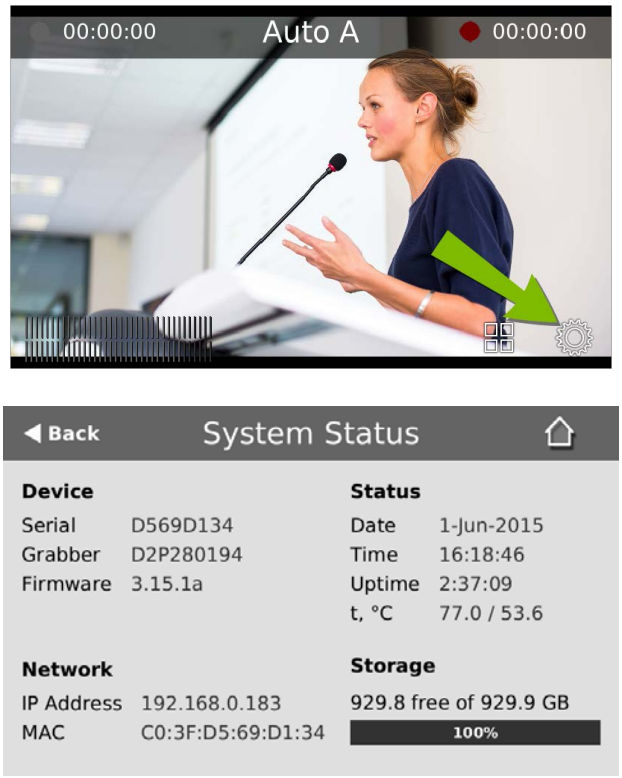


7. Use the touch screen on Pearl-2 for confidence monitoring. To display the single Channel view, simply tap on one of the channels that you see in the Grid view. From the Channel view, you can do things like stop and start recording for the
8. (Optional) Plug headphones or speakers into the 3.5 mm stereo audio jack on the front of Pearl-2 to monitor the audio.

My network IP address and channel monitoring

You can get the network IP address of your Pearl-2 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-2.

1. To find the system's IP address using the touch screentap the **gear** icon in the bottom right corner of the screen and select **System Status**.



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

   For Auto A: http://*<IP Address for Pearl-2>*/preview.cgi?channel=1
   For Auto B: http://*<IP Address for Pearl-2>*/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-2>*/admin

   For example:http://192.1.10.100/admi

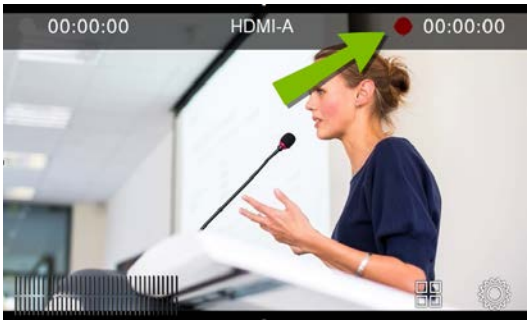
The default user name **admin** has no password set by default. If a password has been set, consult with your system administrator for the login credentials, see What is streaming?

Record the channel

The channel is set up and streaming. This may be all you need, but if you like, you can also record the stream. You can choose to initiate and control channel recording from either the touch screen or the Admin panel.

To control recording from the touch screen:

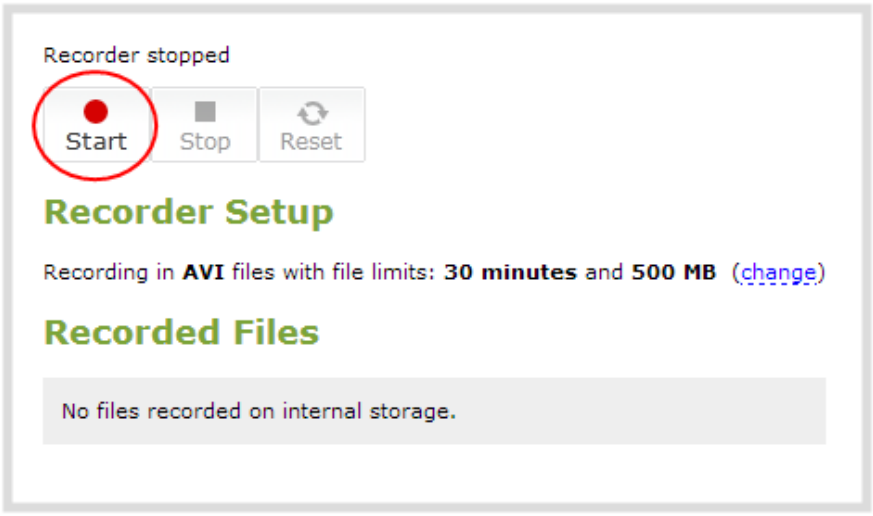
1. If viewing the grid view, tap the channel you want to record. The channel view displays.
2. If the channel controls are not showing on the screen, simply tap the screen to make them appear. If the recording controls don't appear, recording control may be disable for the touch screen, see Configure the touch screen.
3. Tap the red dot to start recording. The record timer starts and continues for as long as the system is recording. Tap the red dot again to stop recording.



To control recording using the Admin panel:

1. From the Channels menu in the Admin panel, click **Recording** for your channel, The Recording page opens.

2. Click **Start** to start recording the channel and click **Stop** to stop recording.



3. Refresh the page. Click **Recording** again in the Channels menu or reload the browser page. The page reloads and a file list appears that shows your newly recorded content.
4. Click the file name to download and view your recording.

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-2, make sure to back up the system configuration using the procedure described in:Create a configuration preset

- 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-2. 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-2'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.

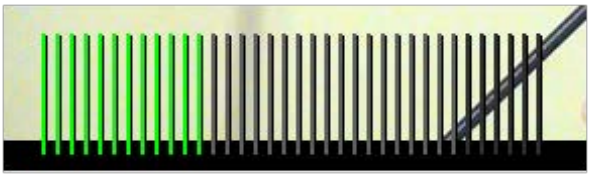
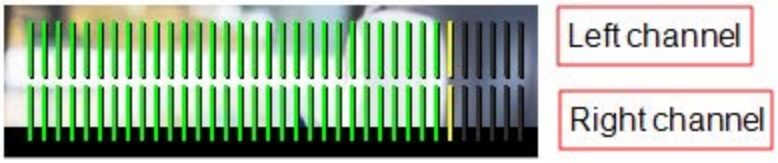
VU meter (mono)	
VU meter (stereo)	

Table 6 *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

You can choose the audio source for a channel using the Admin panel and can have a mix of several different audio sources. Select your audio sources from connected video sources (SDI, HDMI, USB video/audio), as well as the XLR and RCA analog audio input ports.

There are:

- Four XLR professional line-level inputs + 4.0 dBu up to 12.3 V (RMS), (+24 dBu) that support balanced and unbalanced signals.
- One stereo pair RCA consumer line-level input (-10 dBV)
- Two USB video/audio ports
- Four HDMI ports
- Two SDI ports

The four XLR audio inputs are configured as two stereo pairs by default: XLR A (left/right) and XLR B (left/right), see Configure audio ports for stereo or mono. The XLR B audio ports and the RCA audio ports are linked. You can configure Pearl-2 to use both or just one of the audio sources using the Admin panel, see Assign audio sources to an input.

Audio for Auto channels are selected automatically.

This table offers some guidelines for adjusting the gain of the XLR and RCA analog audio input ports, as well as the USB ports. 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. See Adjust audio gain and delay for details.

Table 7 *Audio input port gain guidelines*

Audio source	Input port	Gain
Mobile phone or other consumer line level device	XLR	Add +6 to +12 dB gain to the audio input port.
	RCA	Nominal

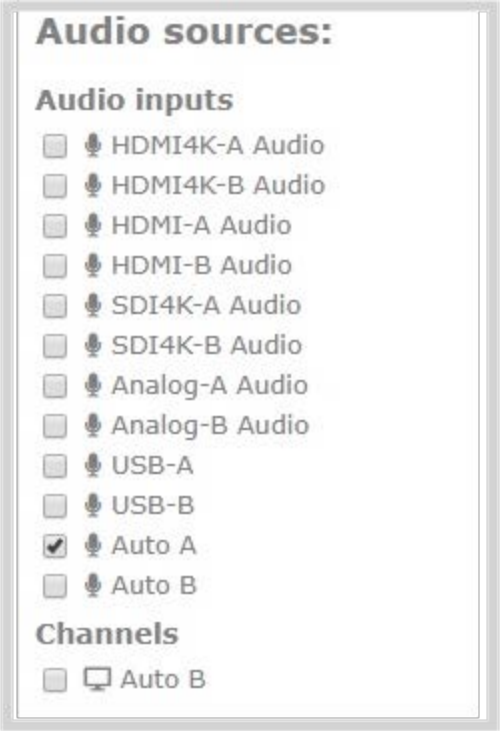
Audio source	Input port	Gain
Professional mixer	XLR	Nominal
	RCA	Not recommended.
USB microphone	USB	Nominal
Dynamic, condenser, or electret microphones	XLR	Not recommended. To connect microphones to the pro line level XLR inputs, you must use an external preamp to boost the microphone signal enough to provide the proper line level signal at the XLR input port, see Connecting microphones to the XLR line level inputs.

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-2 and log in, see Connect to the Admin panel.
2. From the Channels menu, select your channel (i.e. Auto A or Auto B) and click **Layouts**. The custom channel layout editor page opens.

   Audio for Auto channels are selected automatically.

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



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.

Connecting microphones to the XLR line level inputs

The four XLR analog audio input ports on Pearl-2 are professional line level inputs rated at + 4.0 dBu up to 12.3 V (RMS), (+24 dBu). You can't connect microphones directly to the XLR ports because the microphone signal is too low. If you want to connect microphones to the line-level XLR ports on Pearl-2, you must use an external preamp and boost the mic level signal to the appropriate line level before connecting it to the XLR port.

Remote login access

Securely login to the web versions of the Admin panel and Epiphan Live remotely from anywhere you have Internet access. Perform off-site rescue troubleshooting, channel configuration, control streaming and recording, and more using your favorite web browser over a secure connection to the Internet. You don't need to be on the same, local network as Pearl-2. This section contains what you need to remotely access Pearl-2.

Topics include:

- About remote login and control using AV Studio
- Enable or disable AV Studio remote login
- Pair a channel with AV Studio
- Control recording using AV Studio
- Configure channel encoding using AV Studio
- Access web versions of the Admin panel and Epiphan Live

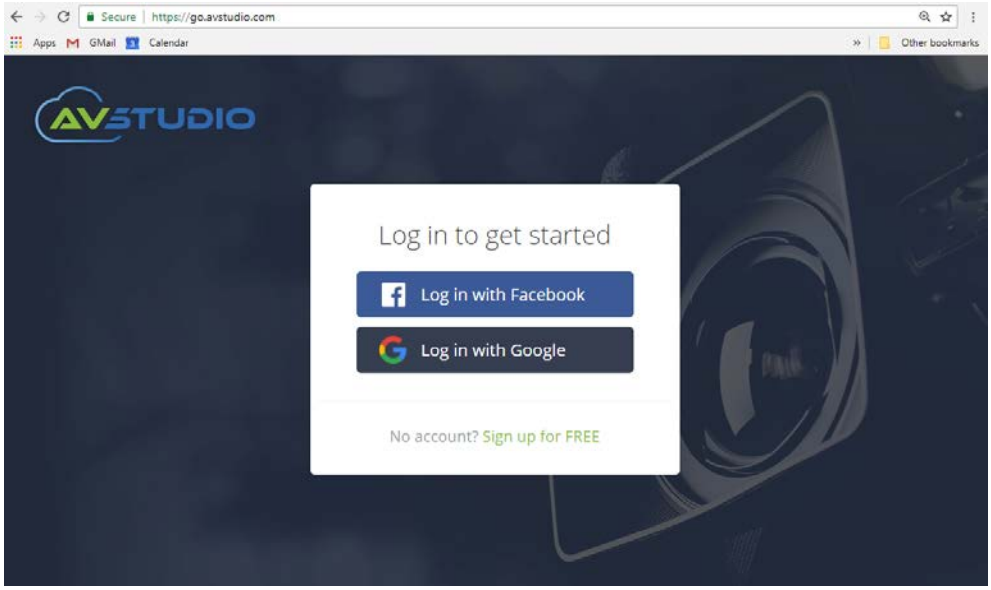
See The Admin panel and Epiphan Live for details about how to use these interfaces and how to access the non-web versions.

About remote login and control using AV Studio

Perform secure remote rescue troubleshooting, channel configuration, and more when you pair your Pearl-2 channels with your free AV Studio account.

AV Studio is a cloud-based platform that allows teams to remotely control video recording encoders like Pearl-2. Use AV Studio to perform quick, low touch editing for fast turn around and cloud delivery of conferences, break out room sessions, seminars, and more.

Access the web version of the Admin panel or Epiphan Live securely from AV Studio. Control recording and do things like check the channel status on Pearl-2 and even make some channel encoding settings from AV Studio.



Remote login access to your Pearl-2 is available as soon as you create a free AV Studio account and pair a channel (or channels). When you've paired a channel to your AV Studio account, you can do things like:

- Start and stop channel recording directly in AV Studio.
- Preview the channel status.
- Set the channel bitrate, frame rate, frame size, and resolution directly in AV Studio.
- Access the web version of the Admin panel to perform remote administration tasks on your Pearl-2 and do remote rescue troubleshooting.
- Access the web version of Epiphan Live to remotely control live switching, recording, and streaming.

You can see which channels are already paired to your AV Studio account from the Configuration menu in the Admin panel when you select **AV studio**. Channels that are paired have a clickable link to your AV Studio account. The channel index number is used to identify channels.

Important considerations

- A secure propriety tunnel over port 443 is used to access the Internet.
- You can pair any channel you want to your AV Studio account and you don't have to pair all your channels. Channels stay paired until you manually unpair the channel.
- The file recording type for the channel you are controlling and recording using AV Studio must be set to MP4 and the maximum file size supported is 500 MB. To set the recording type and maximum file size for a channel, see Configure recording settings, file size and type.
- Do not configure AFU for a channel that is paired with AV Studio.
- Do not create a configuration preset when a channel is paired with AV Studio. Unpair the channel before you create the configuration preset.
- Recordings do not automatically upload to AV Studio. You must manually upload recordings from within AV Studio if you want to do any post-production on them using AV Studio. Some costs are incurred when uploading recordings to a pay-as-you-go AV Studio account.
- Deleting recordings using the Admin panel that have already been uploaded to AV Studio does not remove the recordings from AV Studio.
- The following actions cause the channel's encoder entry to permanently go offline in AV Studio. You will need to pair the channel again to remotely control recording for that channel.
    - Unpairing the channel in AV Studio.
    - Using the Admin panel to delete a channel that it is paired to AV Studio.
    - Using the Admin panel to disable the AV Studio feature on Pearl when a channel is paired to AV Studio.

You can still access any recordings that you previously uploaded and any scenes that were previously created for a channel that is permanently offline in AV Studio until you delete the offline encoder in AV Studio.

Enable or disable AV Studio remote login

Pairing Pearl-2 channels to your AV Studio account for remote login and control is enabled by default. You can disable the AV Studio remote login feature using the Admin panel and enable it again at a later time.

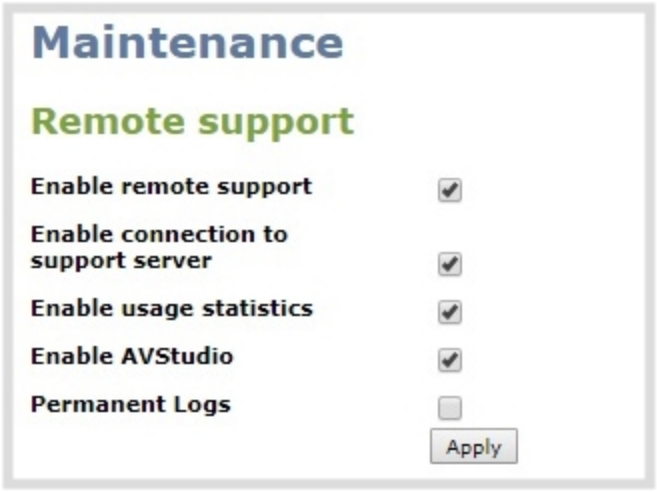
Important considerations

- Unpair all channels that are currently paired with your AV Studio account before disabling AV Studio using the Admin panel.

- If you disable AV Studio remote login while a channel is paired, the encoder appears offline in AV Studio.

To enable or disable AV Studio remote login for a channel:

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 AVStudio** to disable AV Studio remote login or leave it checked to use this feature with Pearl-2, then click **Save**.



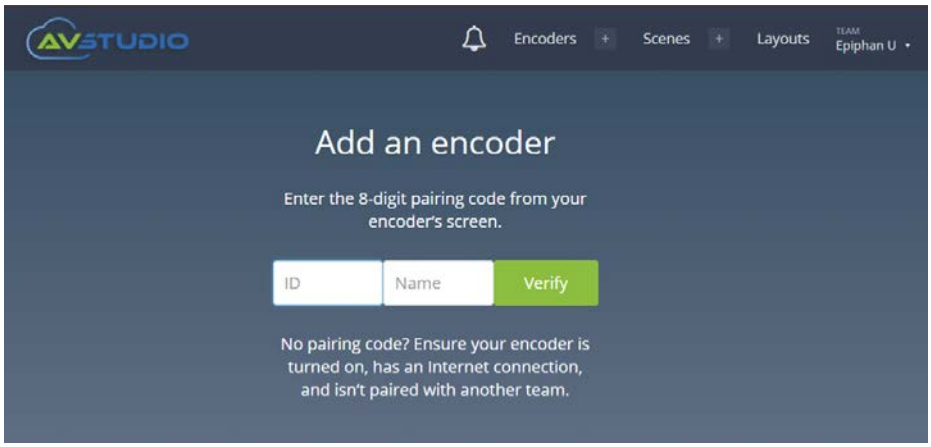
Pair a channel with AV Studio

You can pair one or all your channels to your AV Studio account. You must create an AV Studio account to pair a channel and use the remote login feature, see About remote login and control using AV Studio.

To pair a channel with AV Studio:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, click **AV Studio**. The AV Studio status page opens.

3. Copy the Device ID for the channel you want to pair.
4. On another tab in your browser, login to your AV Studio account at https://go.avstudio.com
5. In the top header bar, click the plus sign beside **Encoders**. The encoder pairing page opens.
6. Paste the Device ID in to the ID field and give your channel a name, then click **Verify**.



Your channel is now paired with your AV Studio account. It appears on the Encoders page in AV Studio and the channel's pairing status updates to **paired** on the AV Studio status page in the Admin panel.

Control recording using AV Studio

You can start and stop recording the channels on Pearl-2 remotely from AV Studio.

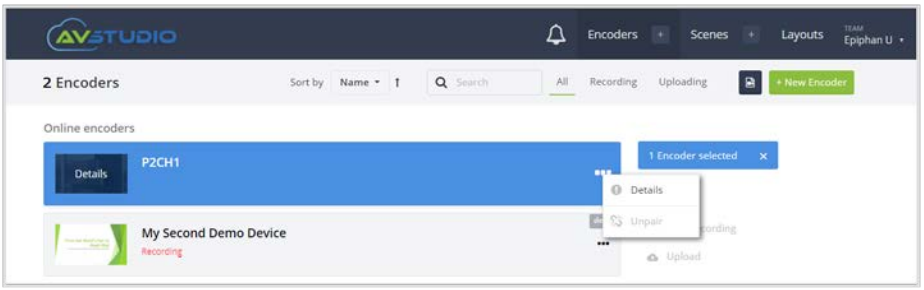
Important considerations

- The file recording type for the channel you are controlling and recording using AV Studio must be set to MP4 and the maximum file size supported is 500 MB. To set the recording type and maximum file size for a channel, see Configure recording settings, file size and type.

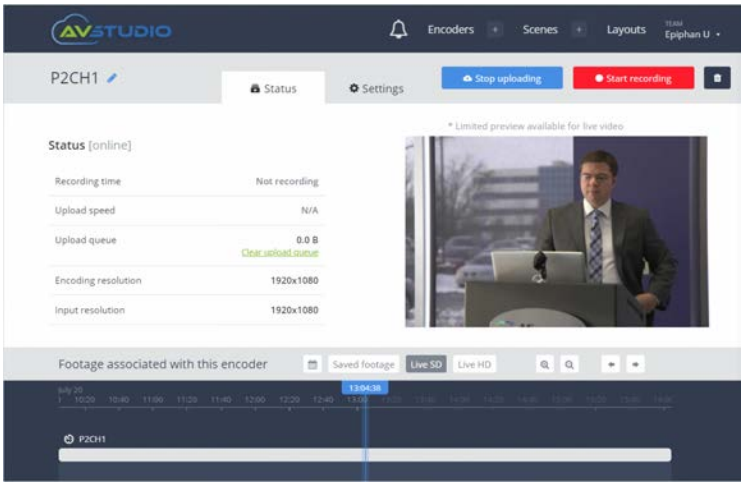
- Do not configure AFU for a channel that is paired with AV Studio.
- Recordings do not automatically upload to AV Studio. You must manually upload recordings from within AV Studio if you want to do any post-production on them using AV Studio. Some costs are incurred when uploading recordings to a pay-as-you-go AV Studio account.
- Deleting recordings using the Admin panel that have already been uploaded to AV Studio does not remove the recordings from AV Studio.
- Deleting a channel using the Admin panel that it is paired to AV Studio causes the encoder to permanently go offline in AV Studio. Recordings that were previously uploaded are still available in AV Studio until you delete the encoder in AV Studio.

To access the web Admin panel from AV Studio:

1. Login to your AV Studio account at https://go.avstudio.com
2. In the top header bar, click **Encoders**. The list of encoders opens.
3. Select the row for the channel you've paired to your AV Studio account and click **Details** in the thumbnail or click the three dots and choose **Details**. The Encoder Details page opens.



4. Click **Start recording** to remotely start recording the channel on Pearl-2. The button changes to **Stop recording**. When you're ready to stop recording the channel, click **Stop recording**.



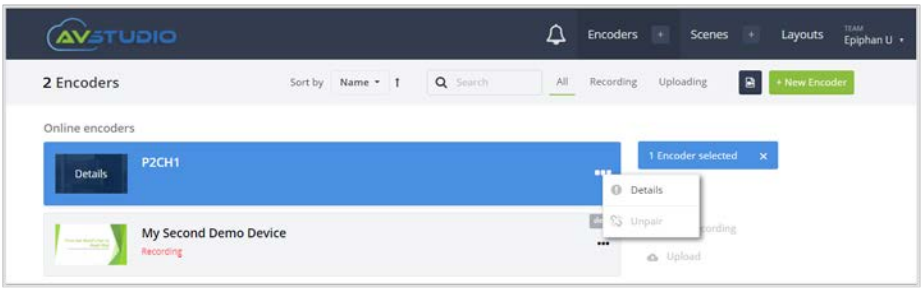
Configure channel encoding using AV Studio

You can remotely configure certain video encoding settings for a channel that is paired with AV Studio, including:

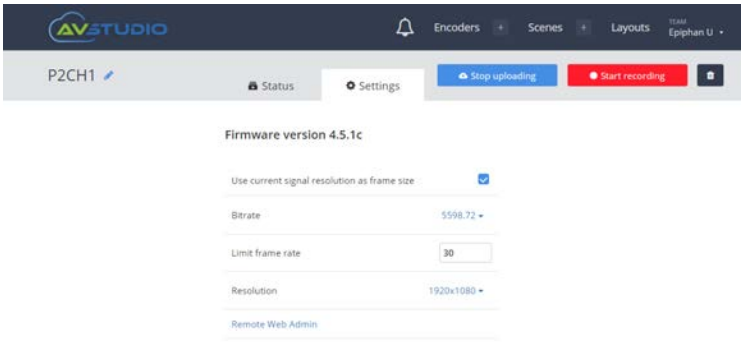
- **Use current signal resolution as frame size**: Select this to allow Pearl-2 to automatically use the frame size of the video input. If you plan to switch layouts during a live stream, a fixed frame rate is recommended. This avoids the stream from stopping and restarting due to frame size changes when switching between single-source layouts that use different frame sizes.
- **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.
- **Limit frame rate**: You can choose a specific frame rate for your channel.
- **Resolution:** Manually select a fixed resolution for the channel to use when streaming, recording, and for output to a confidence monitor.

To access the web Admin panel from AV Studio:

1. Login to your AV Studio account at https://go.avstudio.com
2. In the top header bar, click **Encoders**. The list of encoders opens.
3. Select the row for the channel you've paired to your AV Studio account and click **Details** in the thumbnail or click the three dots and choose **Details**. The Encoder Details page opens.



4. Select the **Settings** tab to configure the encoder settings for the channel. The channel settings on Pearl-2 change automatically after you select the new values here.



The amount of time it takes for the selected option to update on the Settings tab depends on the speed of your Internet connection and how often your connection refreshes. Allow some time for the selected option to update.

Access web versions of the Admin panel and Epiphan Live

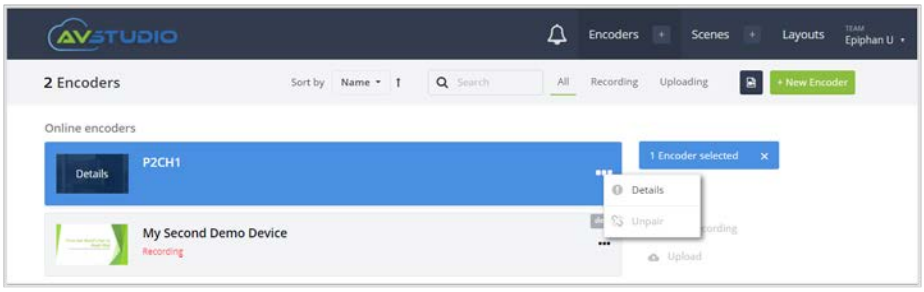
Perform remote configuration and rescue troubleshooting using the web version of the Admin panel. You can access the web Admin panel from any location with access to the Internet after you've paired a channel to your AV Studio account, see Pair a channel with AV Studio. Use the same login credentials for both versions of the Admin panel.

After you've logged in to the web Admin panel, you can open the web version of Epiphan Live and perform live switching, recording, and streaming control.

The URLs of the Admin panel and Epiphan Live are not the same as the URLs of the web versions.

To access the web versions of the Admin panel and Epiphan Live:

1. Login to your AV Studio account at https://go.avstudio.com
2. In the top header bar, click **Encoders**. The list of encoders opens.
3. Select the row for the channel you've paired to your AV Studio account and click **Details** in the thumbnail or click the three dots and choose **Details**. The Encoder Details page opens.



4. Select the Settings tab and click **Remote Web Admin**. A new tab with the web Admin panel login opens in your browser.
5. Enter your Admin panel login credentials to log in to the web version Admin panel . The default administrator username is **admin**.
6. Click **Epiphan Live** in the upper-right corner of the Status page for a channel. The Epiphan Live dashboard opens in a new tab.

See The Admin panel and Epiphan Live for details about how to use these interfaces and how to access the non-web versions.

Specifications

Topics include:

- AV inputs
- Tech specs
- Optimum CPU performance

AV inputs

When using Pearl-2, we recommend a maximum of six 1080p sources in up to 6 full HD channels or having up to four 4K sources[4K] in a single channel for best performance. Only content that is not HDCP-protected is captured from HDMI and USB video sources.

Pearl-2 supports the following AV inputs. However, Pearl-2 does support the use of many common signal converters and input adapters.

Pearl-2 Rackmount Twin has two complete sets of these inputs.

Table 8 *Inputs for Pearl-2*

Input port	Qty	Details
SDI[1]	2	Linear PCM audio/video input. Supports up to 12G-SDI signals.
HDMI™	2	Linear PMC audio/video input, non-HDCP protected. DVI-I (using an adapter) is single link.
4K HDMI[2]	2	Linear PMC audio/video input, non-HDCP protected. DVI-I (using an adapter) is single link.
USB 3.0	2	Linear PCM audio/video input accepts non-HDCP protected content. Use to connect UAC or UVC devices, such as USB microphones and web cameras. Can also connect to external hard drives, flash drives, and control interfaces.
RCA[3]	2	RCA consumer line-level audio inputs function as a stereo pair (-10 dBV). • White = left • Red = right

Input port	Qty	Details
XLR[3]	4	The XLR inputs accept balanced and unbalanced, pro line level signals (+4.0 dBu) up to 12.3 V (RMS), (+24 dBu). By default, the four XLR ports operate as two stereo left/right audio pairs (XLR A pair and XLR B pair). You can configure the ports to operate as independent mono inputs using the Admin panel, see Configure audio ports for stereo or mono.

[1] SD-SDI audio is not supported
[2] Requires 4K feature add on
[3] In the Admin panel, Analog audio B includes audio signals from the XLR B audio pair and the RCA audio pair by default. You can disable one or the other using the Admin panel, see Assign audio sources to an input.

If you are using DVI2PCIe cards with your Pearl-2, DVI2PCIe cards do not support audio over HDMI.

Tech specs

The input and output connectors are listed for Pearl-2 and Pearl-2 Rackmount. Pearl-2 Rackmount Twin is made up of two completely independent Pearl-2 systems, therefore it has double the number of inputs and outputs that are listed in this table.

For the most up-to-date product specifications and information, go to www.epiphan.com/pearl-2.

Table 9 *Specifications for Pearl-2*

Video Inputs	Connectors	(2) 12G SDI (2) HDMI™ / DVI[1] (2) 4K HDMI[2] / DVI[1] (2) USB video
	Resolutions	Most common and custom HDMI/DVI/SDI/USB modes up to 4096×2160
	Video Format Options	3G-SDI; 6G-SDI; 12G-SDI; 4K-SDI; HD-SDI; SD-SDI DVI single link (through an adapter), USB video through USB Webcamera or UVC AV.io video grabber; HDMI, 4K HDMI[2]

<table>
<tr><td rowspan="2">Audio Input</td><td>Connectors (balanced or unbalanced signals)</td><td>(4) XLR Pro line level + 4.0 dBu (or 2 stereo pairs left/right) accept balanced and unbalanced analog signals. No phantom power.
(1) Stereo RCA (Consumer line level, - 10 dBV)
(2) SDI audio[3]
(4) HDMI audio
(2) USB audio</td></tr>
<tr><td>Analog audio sensitivity</td><td>XLR Max signal: 12.3 V (RMS), (+24 dBu)
RCA signal level: - 10 dBV</td></tr>
<tr><td rowspan="2">Video Output</td><td>Connectors</td><td>(2) HDMI out with audio for local video display or larger confidence monitoring</td></tr>
<tr><td>Built-In Display</td><td>Front touch screen display used for system information, confidence monitoring, simple configuration and recording control</td></tr>
<tr><td>Audio Output</td><td>3.5 mm audio</td><td>Front-mounted jack for confidence monitoring</td></tr>
<tr><td rowspan="5">Video Encoding</td><td>Video Codecs</td><td>H.264, Motion JPEG</td></tr>
<tr><td>Video Bit Rates</td><td>1 - 50 Mb/s</td></tr>
<tr><td>Key Frame Intervals</td><td>Programmable</td></tr>
<tr><td>Color Resolution</td><td>4:2:0</td></tr>
<tr><td>Output Frame Size</td><td>Configurable up to 4096×2160</td></tr>
<tr><td>Audio Encoding</td><td>Audio Codecs</td><td>
<table>
<tr><td>Encoder</td><td>Bitrate</td><td>Sample Frequencies</td></tr>
<tr><td>MP3</td><td>64-320 kbps</td><td>22 kHz, 44 kHz, 48 kHz</td></tr>
<tr><td>PCM</td><td>-</td><td>22 kHz, 44 kHz, 48 kHz</td></tr>
<tr><td>AAC</td><td>64-320 kbps</td><td>16 kHz, 22 kHz, 44 kHz, 48 kHz</td></tr>
</table>
</td></tr>
</table>

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 (RTSP, 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	Internal Storage[4]	512 GB SSD
		Automatically removes oldest recordings from internal storage as space is required.
		File maintenance through admin interface (Web UI)
	Local Storage	Automatic or manual copy to local USB drives via the (3) USB 3.0 ports
	Network Storage	FTP server and FTP client capabilities (automatic and manual)
	Playback and Recorded Formats	Download recorded videos (AVI, MOV, MP4 or MPEG-TS) using the Web UI and playback through any compatible player.
Administration	Web UI for full administration. On-screen display and mobile UI for confidence monitoring and simple administration and control.	
	Multiple user accounts/passwords.	
	Included API for integration into existing environments (executed via HTTP or RS-232).	
Time Synchronization	NTP, TIME (RFC 868), PTP v1 (IEEE-1588-2002 V1)	
Power use	0.8 A, 100-240 V ac	
Product Dimensions	Pearl-2: 11.81" × 9.45" × 3.54" (300mm x 240mm x 90mm) Pearl-2 Rackmount: Pearl-2 Rackmount Twin	

	Pearl-2 Rackmount Twin: 19 ⅛" x 3½" x 10 ⅞" (498 mm x 89 mm x 276 mm)
Product Weight	Pearl-2: 8.38 lbs (3.8 kg) Pearl-2 Rackmount: 12.1 lbs (5.5 kg) Pearl-2 Rackmount Twin: 14.6 lbs (6.6 kg)
Country of Origin	Made in Taiwan

[1]Using HDMI port, with adapter

[2]Requires 4K feature add on

[3]SD-SDI audio is not supported.

[4]A portion of the hard drive space (approximately 100 MB) is reserved for system use. Recording space can be virtually unlimited with offload to networked storage.

Optimum CPU performance

Pearl-2, Pearl-2 Rackmount and Pearl-2 Rackmount Twin are powerful live video production systems; 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-2'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-2 doesn't have to up scale or down scale the video source.

User interfaces

Pearl-2 has three user interfaces:

- **Touch screen**: Easily accessible on the front panel of Pearl-2, 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-2. 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-2, 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.

For details about how to access the web versions of the Admin panel and Epiphan Live for remote login, see Access web versions of the Admin panel and 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-2's front panel includes a touch screen display that's used for confidence monitoring, basic configuration, and one-touch streaming and recording control.

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-2, 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 only the two default auto channels: Auto-A and Auto-B.

In this example, the grid view shows two video sources, which are plugged into video input ports A and B on Pearl-2 and are displayed in auto channels Auto-A and Auto-B, respectively.

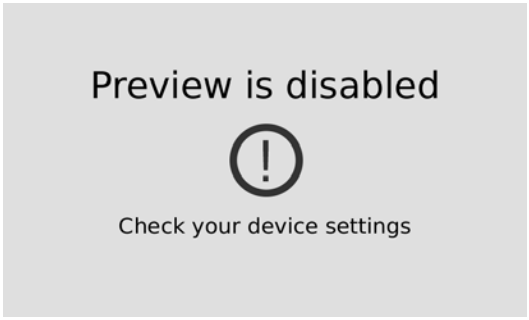
If no video sources are connected, or your sources aren't sending a signal, the grid view shows no signal images. See About automatic channels Auto A and Auto B for more details about auto channels.

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

A No Channels screen appears if there are no channels configured on your Pearl-2 and the automatic channels **Auto A** and **Auto B** have been deleted. Tap anywhere on this screen to go to the system settings screen.

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-2 can be monitored and controlled using the touch screen. After you power on Pearl-2 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.

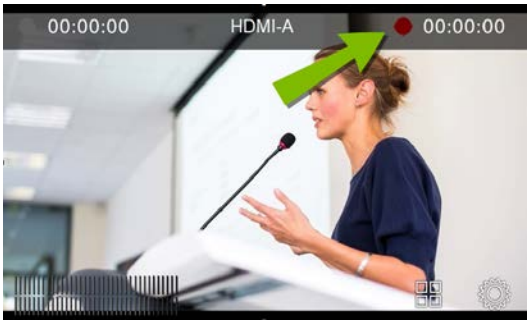
Table 10 *Parts of the touch screen for the individual channel view*

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 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

Item	Description
	touch screen.

Record a channel using the touch screen

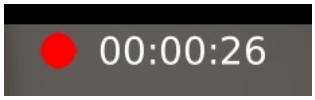
Use Pearl-2's touch screen to easily start and stop recording of a channel. Simply tap the recording control button that appears in the channel view.



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-2 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.

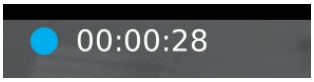
Stream a channel using the touch screen

Use Pearl-2'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-2 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

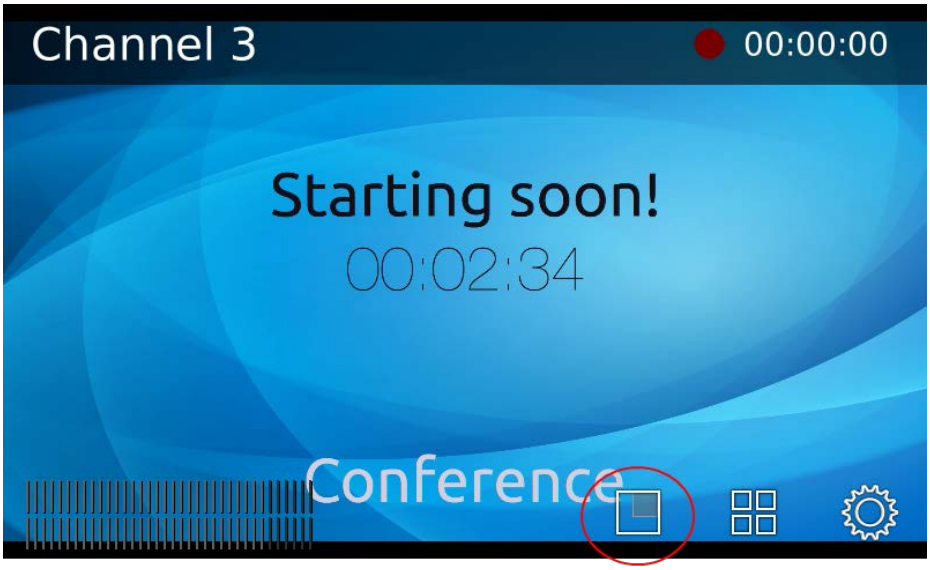
Switching live video inputs, or video mixing, is simple and intuitive using Pearl-2's touch screen. After you select the channel you want to live switch, just tap the layout switching icon to open the convenient switcher on the touch screen. All custom layouts that are configured for the channel display 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.

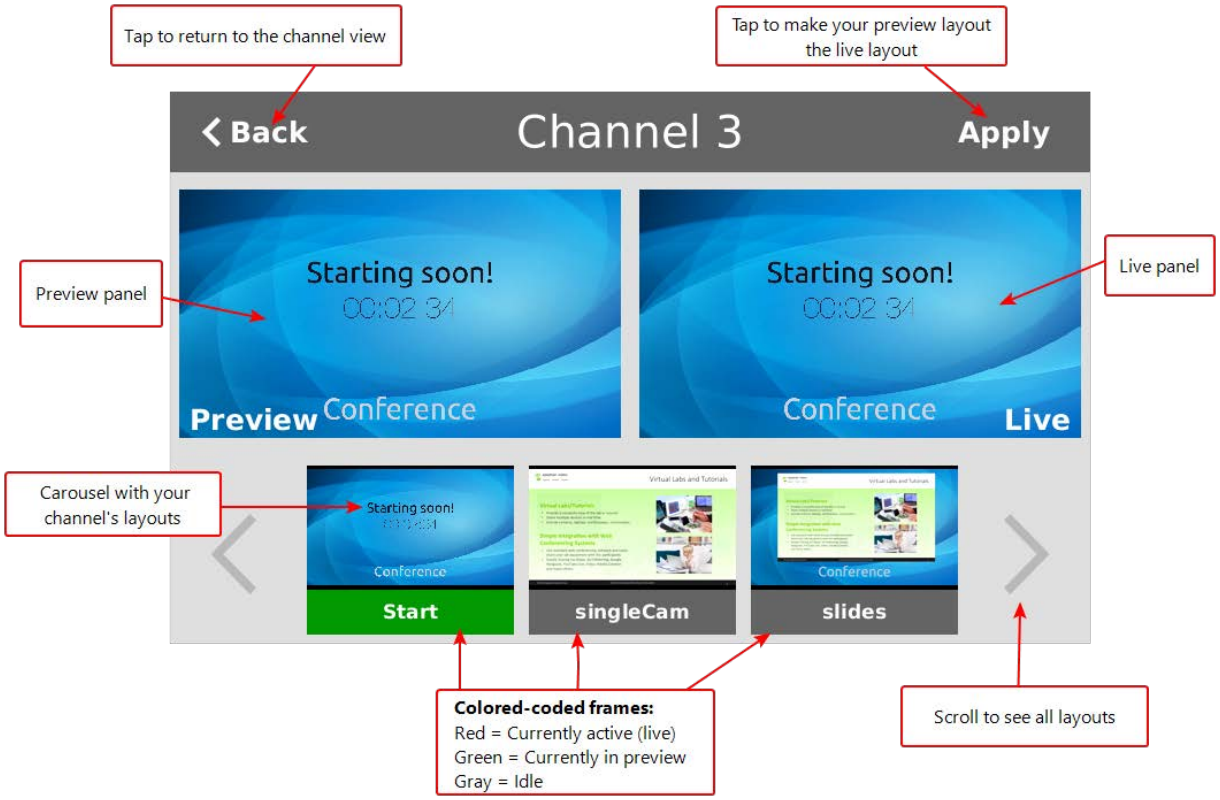
If the live switching controls don't appear on the touch screen, they may have been disabled, see Disable or enable recording, streaming and switching from the touch screen.

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.



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-2 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

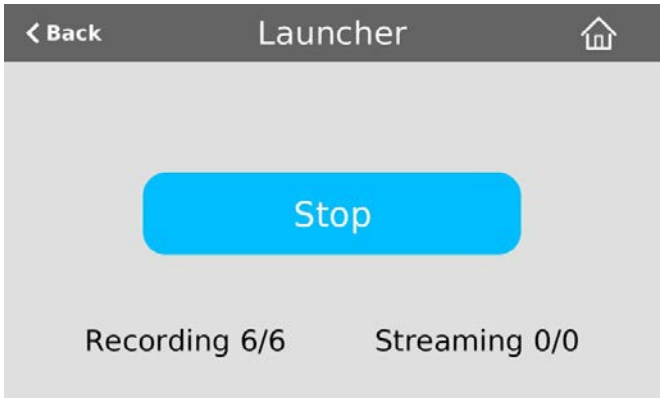
The One Touch feature lets you control the recording and streaming of multiple channels and recorders with the touch of a single button on the touch screen of Pearl-2. You simply specify which channels and recorders to include for One Touch control using the Admin panel.

To open the One Touch control screen from the touch screen on Pearl-2, simply tap the **One Touch control** icon.

Table 11 *One Touch control screen components*

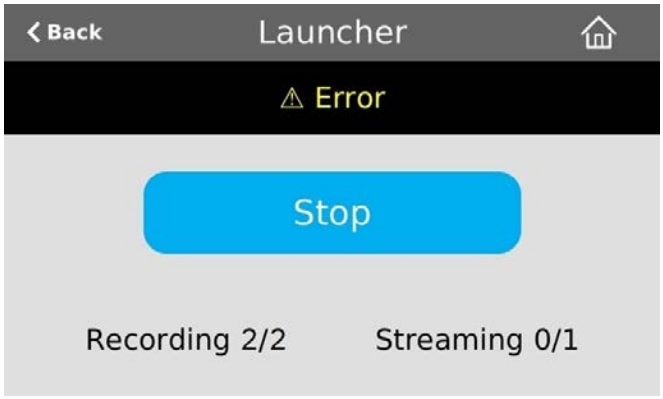
Label	Description
1	**Start/stop button**: Press the One Touch control button to start or stop streaming and recording for all specified channels and recorders.
2	The number of recorders and/or channels that are actively recording (the first number) over the total number of channels that are configured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

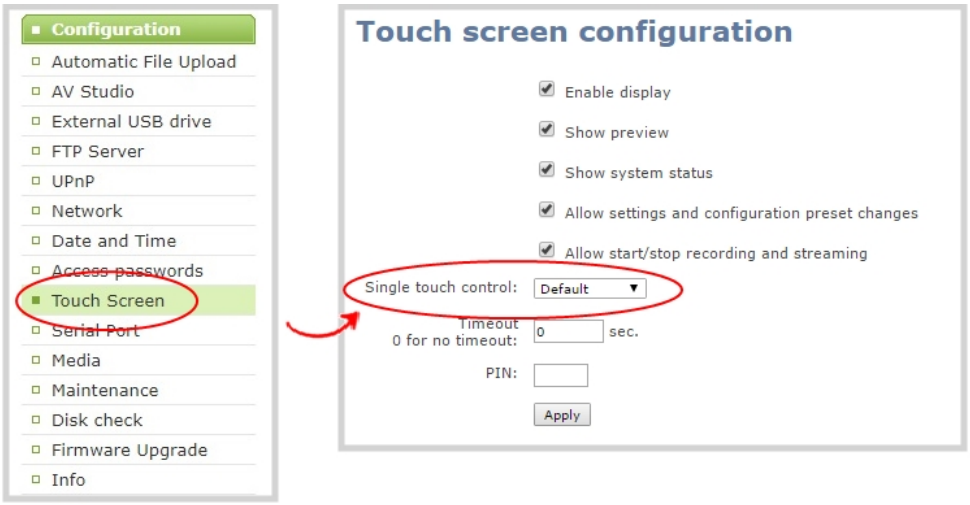
Customize the One Touch control display

You can use the Admin panel to customize how One Touch Control is displayed on the touch screen of Pearl-2:

- **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-2. 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-2. 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.



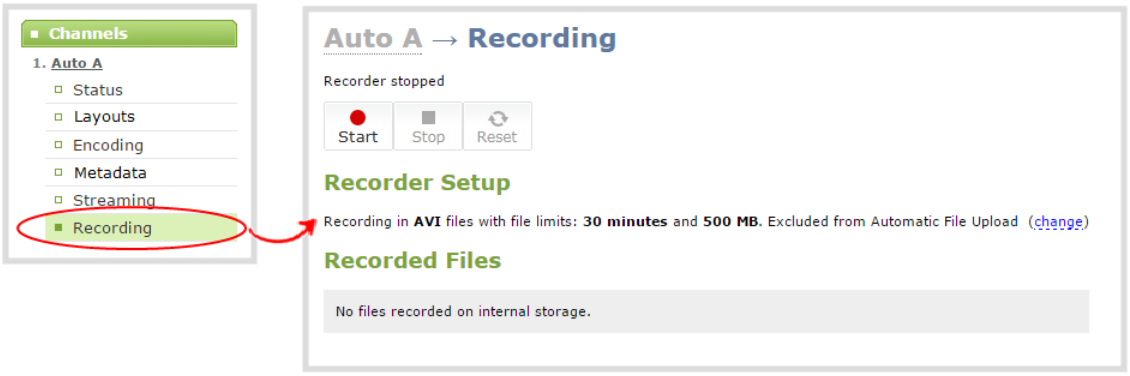
3. Click **Single touch control** and select either **Default**, **Start Screen** or **Locked**.
4. Click **Apply**.

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

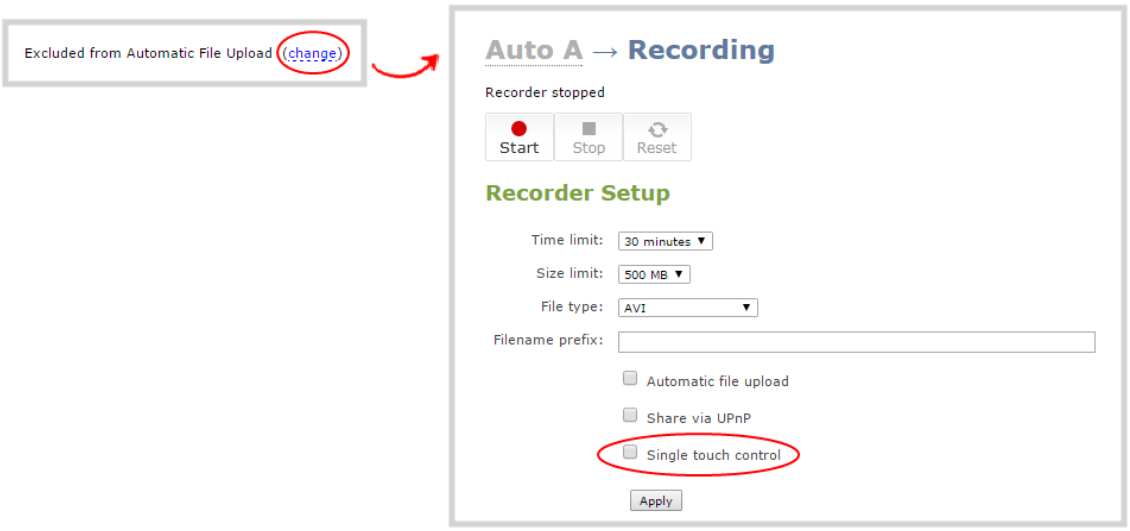
Specify channels and recorders for One Touch recording

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.



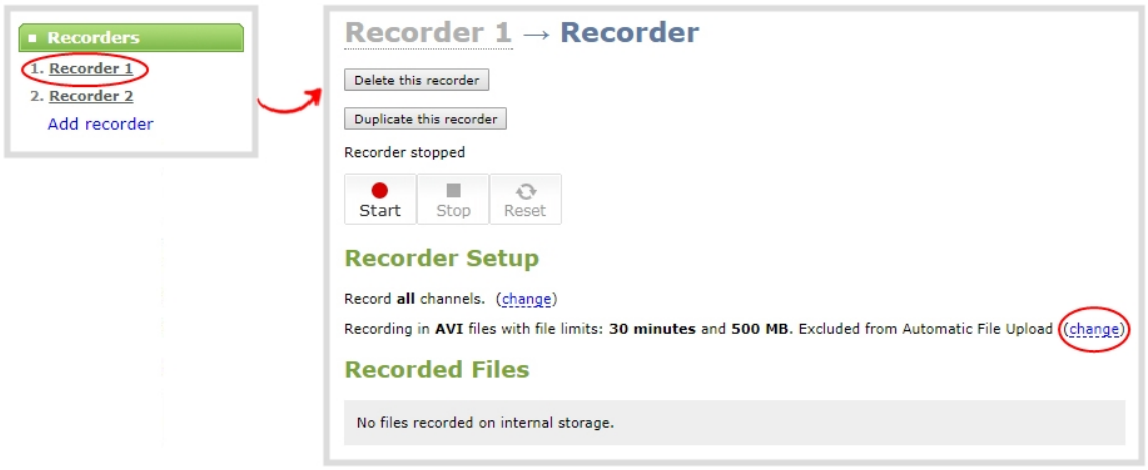
b. Click **change**, and then check **Single touch control** on the options page to enable the channel for One Touch control. Uncheck the check box if you don't want to include that channel for One Touch control.



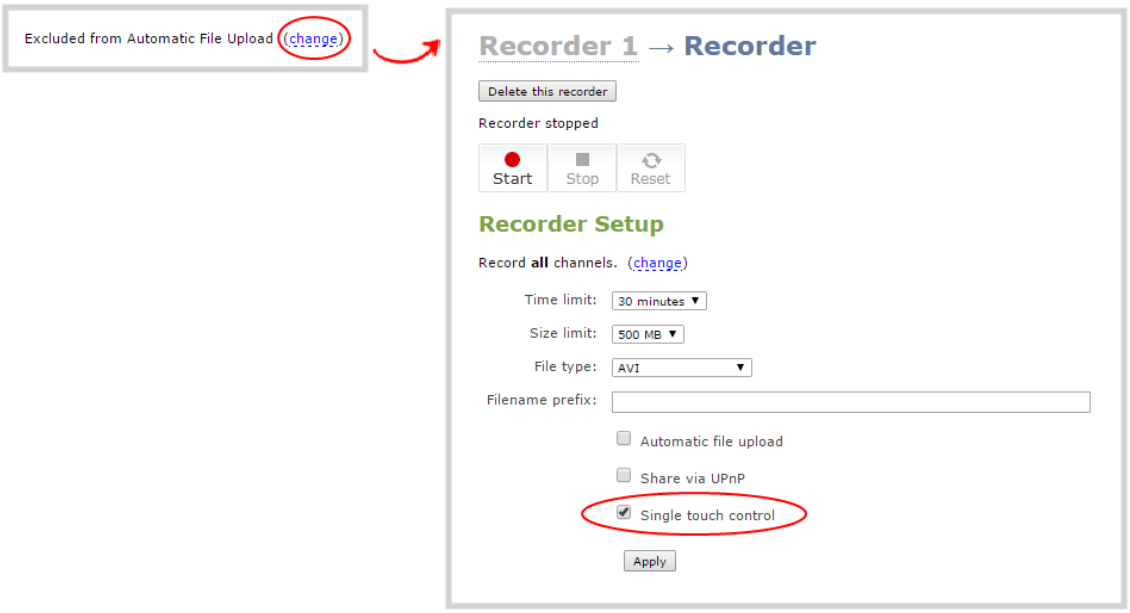
c. Click **Apply**.

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**.

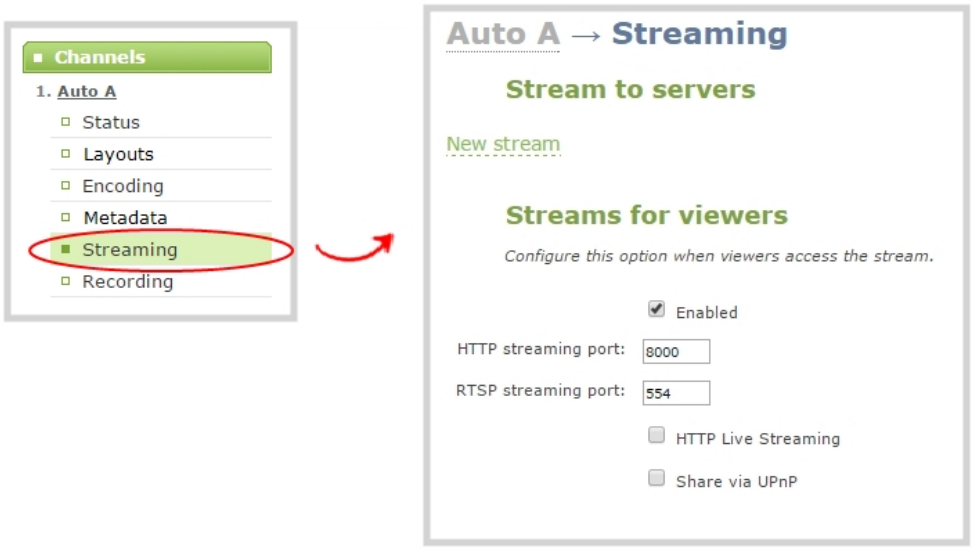
To learn how to configure your channels for recording, see **Record**. To learn how to configure recorders, see **Recorders**

Specify channels for One Touch streaming

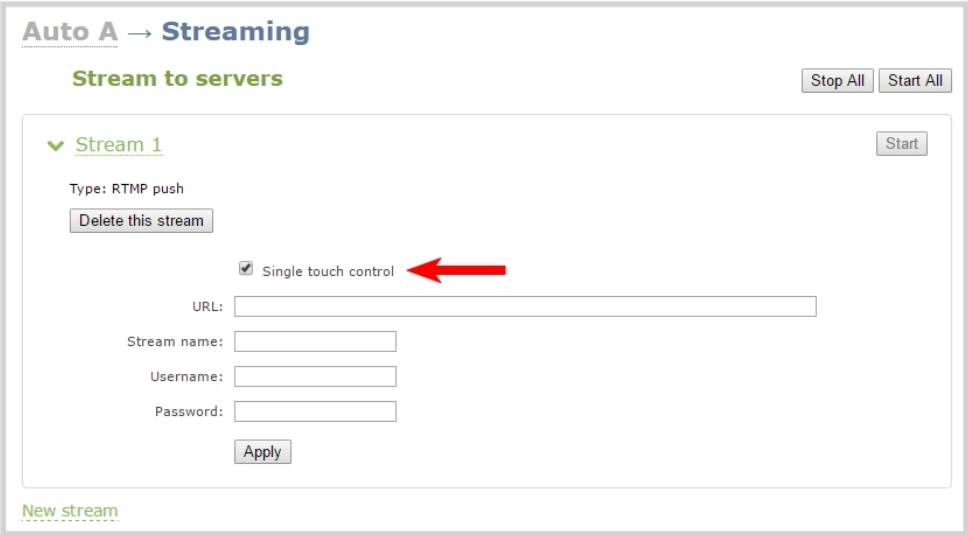
Channels are not enabled for One Touch streaming by default. You can enable and disable One Touch streaming control for individual channels using the Admin panel.

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-2 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-2 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:

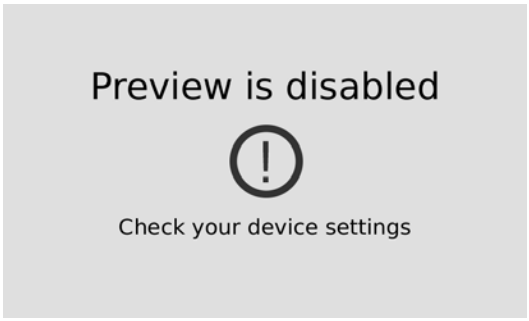
1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, click **Touch Screen**. The touch screen configuration page opens.

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

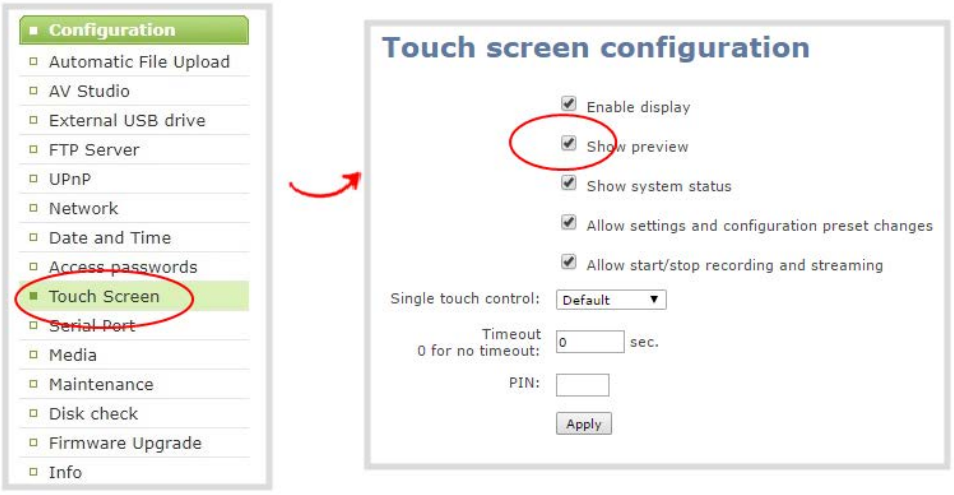
Previews of your configured channels display on the touch screen of Pearl-2 by default. You can disable channel previews using the Admin panel.

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.



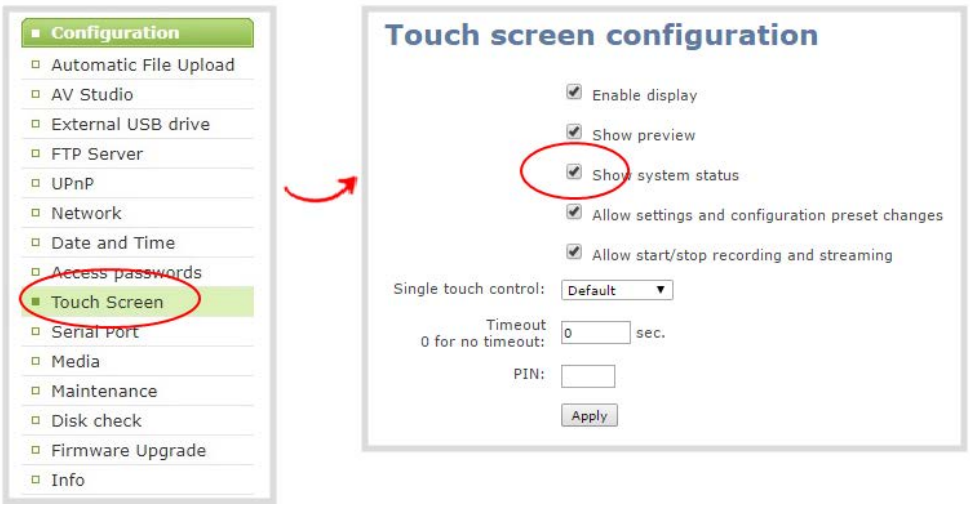
3. Uncheck **Show preview** to disable channel previews from displaying on the touch screen. Check **Show preview** if you want to enable channel previews on the touch screen.
4. Click **Apply**.

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-2. You may not want this information visible on the touch screen after you've configured Pearl-2. 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**.

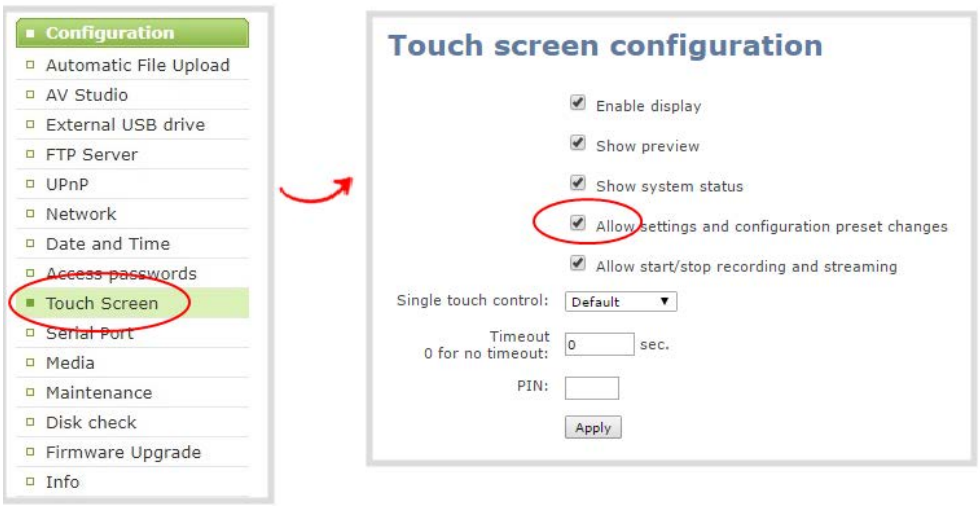
Disable or enable configuration using the touch screen

You can apply configuration presets and configure network settings using the touch screen on Pearl-2 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**.

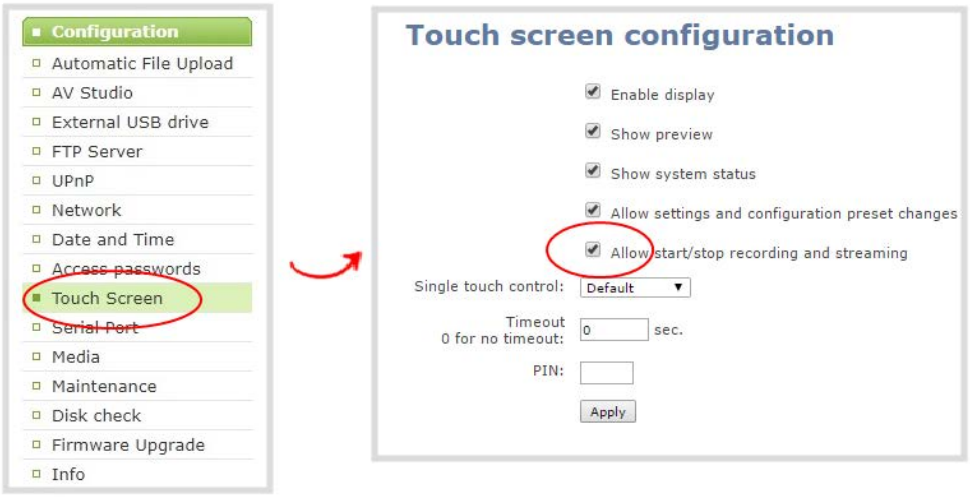
Disable or enable recording, streaming and switching from the touch screen

Recording, streaming, and live switching control using the touch screen on Pearl-2 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.



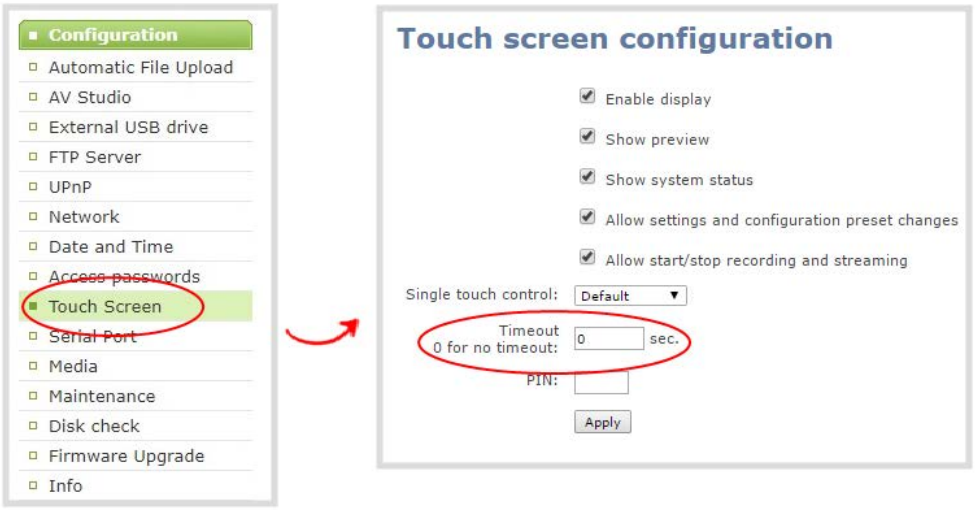
3. Uncheck **Allow start/stop recording and streaming** to disable recording, streaming, and live switching control from the touch screen. Check the check box to enable recording, streaming, and live switching control.
4. Click **Apply**.

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.



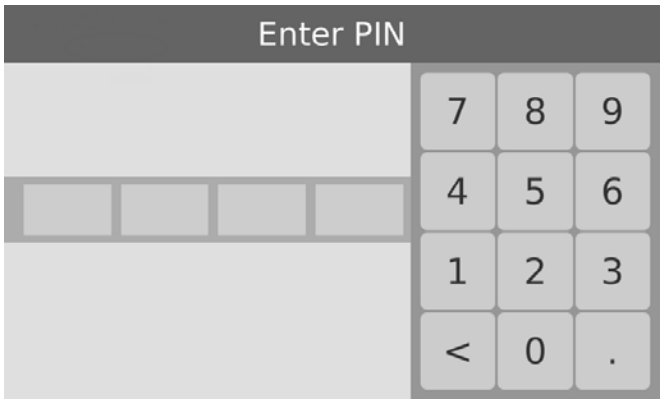
3. Enter the number of seconds before the touch screen automatically shuts off in the **Timeout** field. A value of 0 keeps the touch screen on at all times when the system is on.
4. Click **Apply**.

Set a 4-digit PIN security code

You can set a 4-digit PIN code to protect the touch screen of Pearl-2 from unauthorized access. By default, the PIN is not set.

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

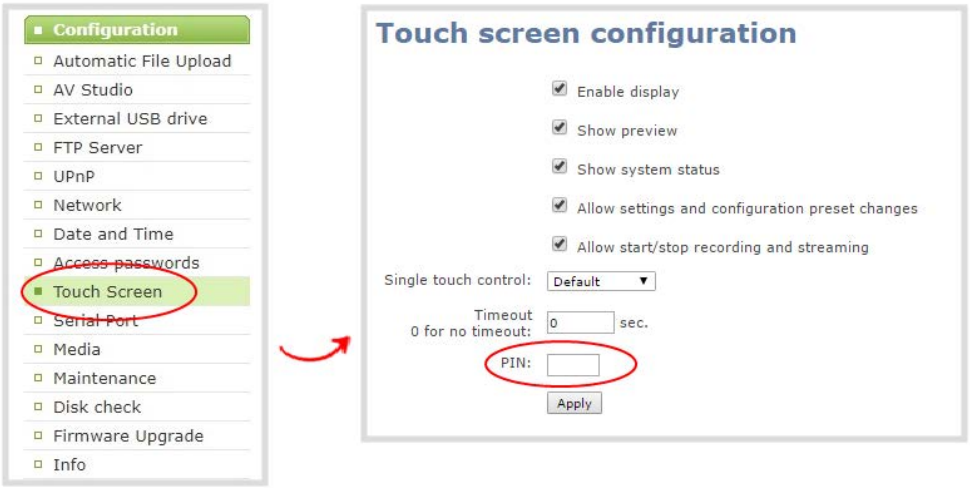
- When you power on or restart Pearl-2.
- When Pearl-2 recovers from timeout mode, see Set the touch screen timeout.



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-2.

4. Click **Apply**.

The Admin panel

The Admin panel is used primarily to set up your Pearl-2 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

For information about remote access to the web version of the Admin panel, see Access web versions of the Admin panel and Epiphan Live.

About the Admin panel

The Admin panel is a web-based user interface that's used primarily to set up your Pearl-2 and perform administrative tasks.

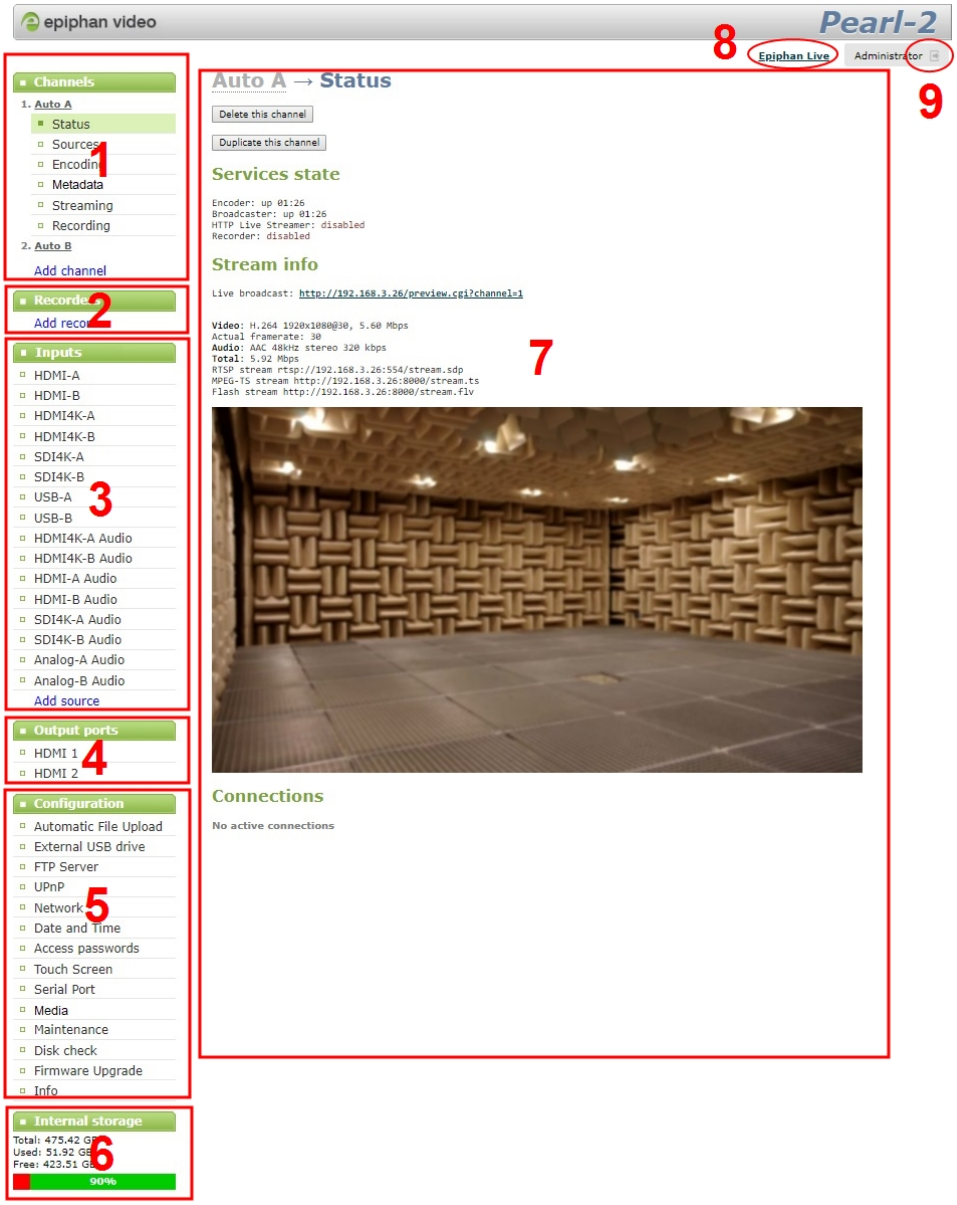


Table 12 *The Admin panel*

Label	Name	Description
1	**Channels menu**	The channels that are available for the current configuration of your Pearl-2 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.

Label	Name	Description
2	**Recorders menu**	Recorders you add to your Pearl-2 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.
3	**Inputs menu**	The available video and audio input ports on your Pearl-2 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-2 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-2. Click icon again to display the log in window. The role of the currently logged in user displays beside the icon.

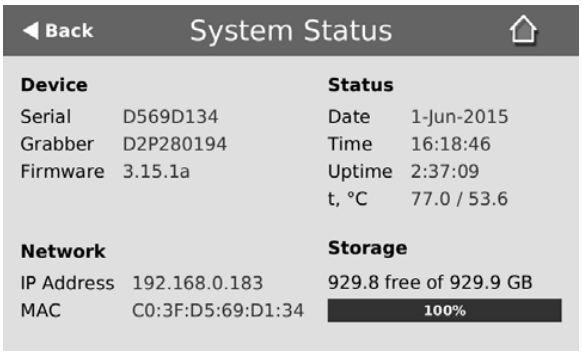
Connect to the Admin panel

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-2. You need the IP address of the system, which you can get from the settings using the front touch screen of your Pearl-2. 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-2. 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-2, enter the following into the address bar of your web browser to launch the Admin panel.

   http://<IP Address of Pearl-2>/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:

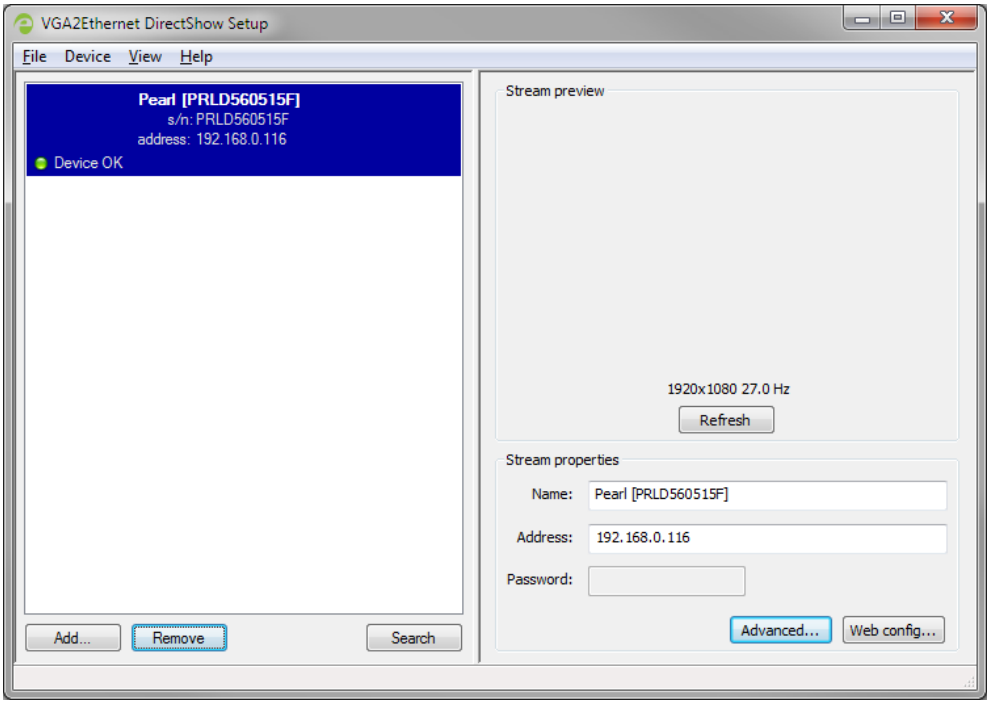
- Connect using persistent static IP address

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.

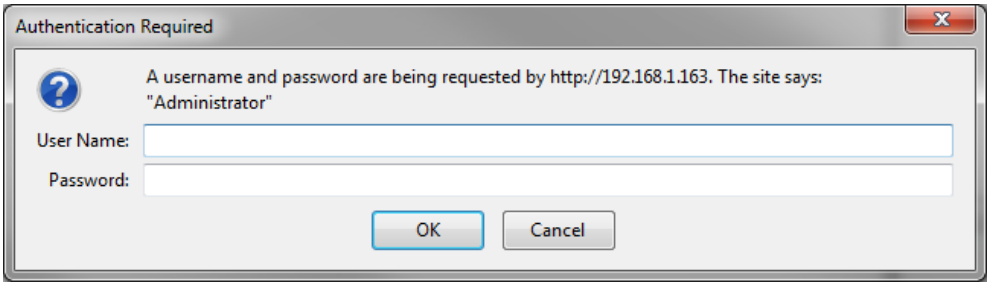
To access the Admin panel using the Epiphan discovery utility:

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-2 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-2>*/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-2 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 13 *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-2 using DNS discovery:

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

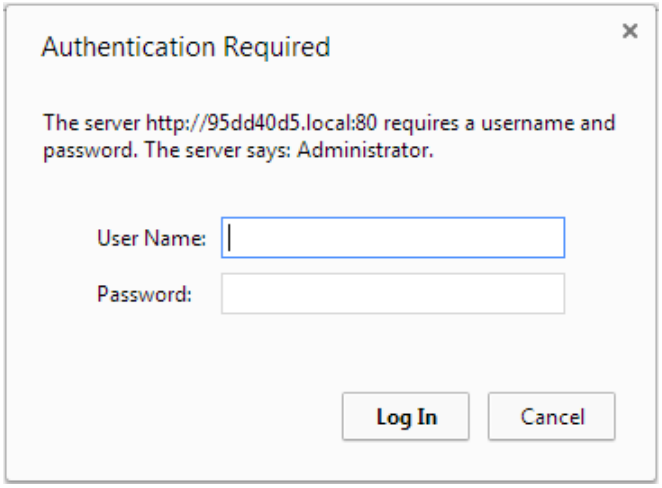
   TIP: The serial number also appears on the System information screen from the touch screen of Pearl-2. Tap the system information gear icon to display the System information screen. If needed, tap the screen once to display the control icons.

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-2:

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-2 has a default persistent static IP address, also known as the **recovery IP address**. If ever you need to set up Pearl-2 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-2 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-2 and the workstation using one of the following methods:
    a. Connect Pearl-2 to a local Ethernet network shared with the workstation.
    b. Connect Pearl-2 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-2 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-2. 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

For information about remote access to the web version of Epiphan Live, see Access web versions of the Admin panel and Epiphan Live.

About Epiphan Live

The Epiphan Live interface lets you easily operate your Pearl-2 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.

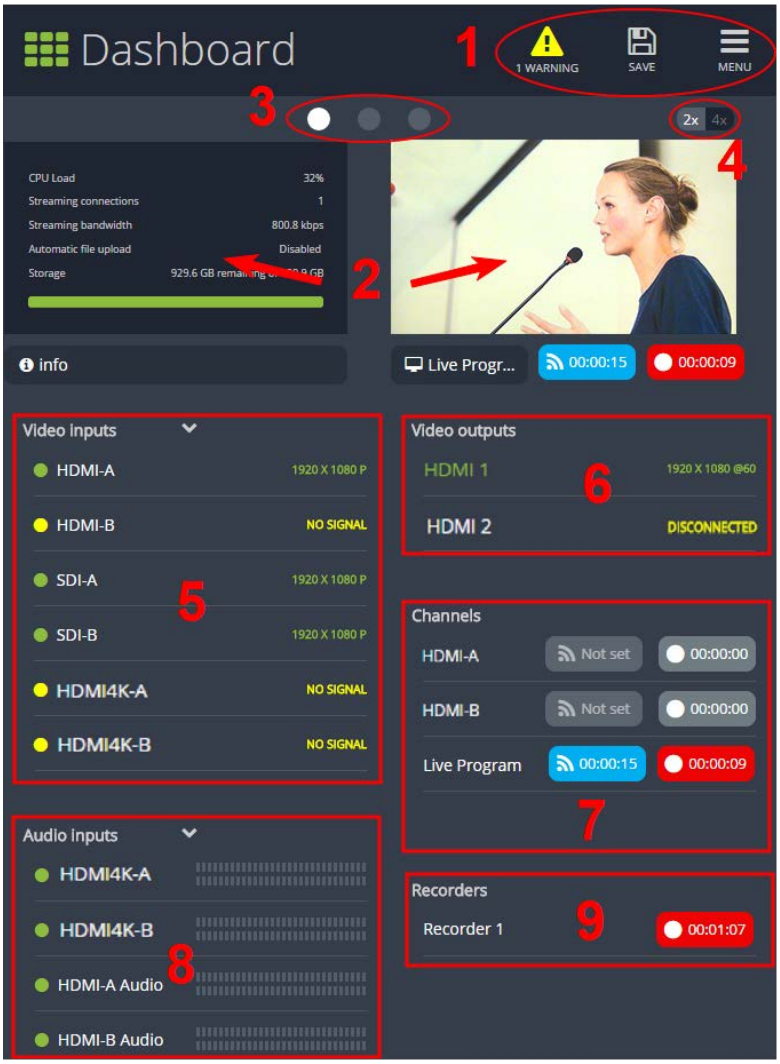


Table 14 *Elements in the Dashboard interface*

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-2 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-2>/admin/m

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

      http://<IP address of your Pearl-2>

2. Enter your administrator or operator credentials when prompted.

Some versions of Chrome and Microsoft Edge don't display channel previews from the Dashboard if you're on an HTTPs network and your website has an insecure or invalid security certificate, even after you update the security certificate. Use a different web browser such as Firefox or update the version of your web browser, then add the security certificate for the website to the exceptions list.

Access Epiphan Live from the Admin panel

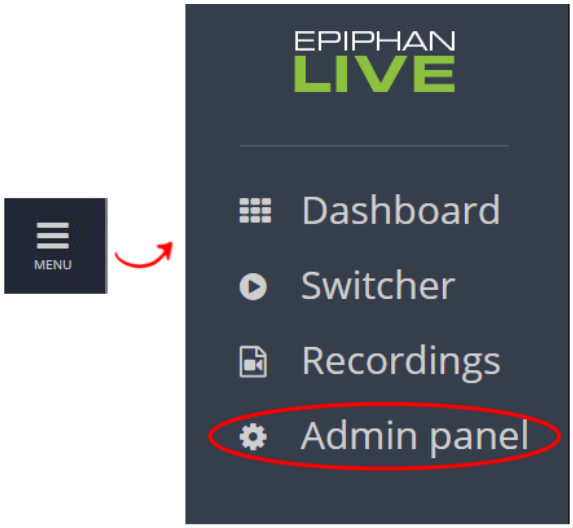
You need the IP address of your Pearl-2 to log in to the Admin panel for this procedure, see Connect to the Admin panel.

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

   http://<IP address of your Pearl-2>

2. Click **Epiphan Live** in the upper-right corner of the Status page for the channel. 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:

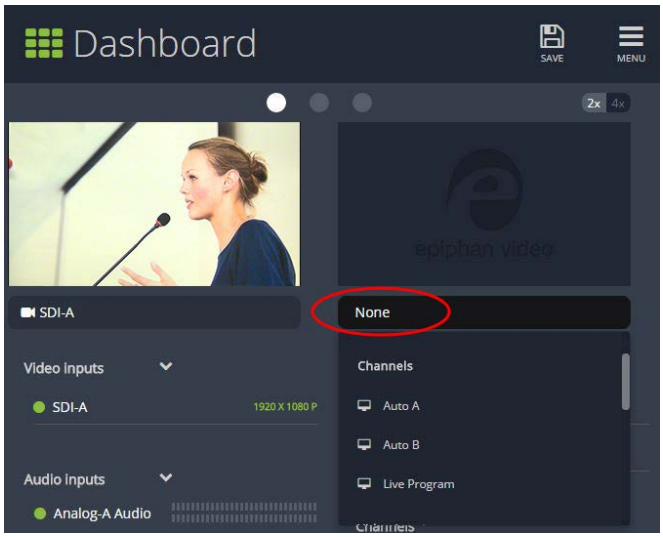
- CPU load (%)
- Quantity of streaming connections
- The current streaming bandwidth (bitrate)
- Automatic file upload status (enabled or disabled). See File and recording transfer.
- Storage available on your Pearl-2.

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

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.

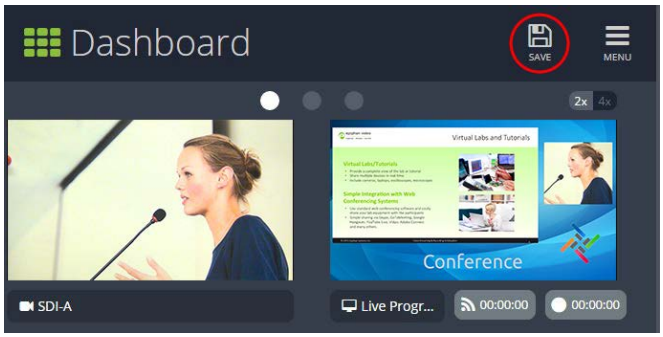
To configure Dashboard panels:

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.



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.

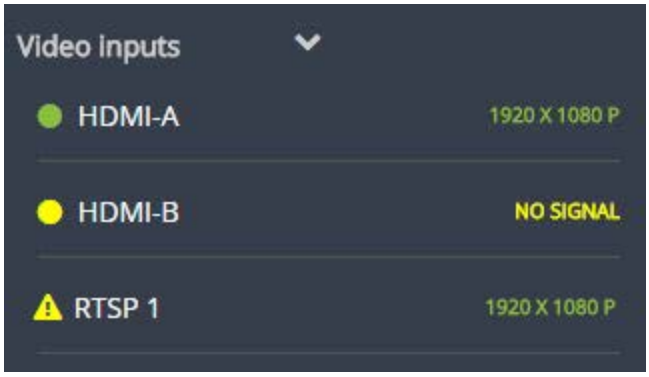
3. (Optional) To choose between displaying 2 or 4 panels, tap the **2x|4x** icon that appears in the upper-right corner of the panels area.
4. Tap **Save**.



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

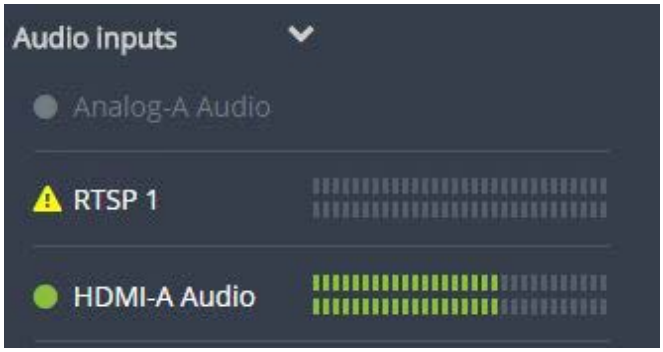
Use the Dashboard to monitor your video and audio inputs. The video inputs section of the Dashboard lists all inputs configured on your Pearl-2 and displays the video resolution.



- 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-2 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 15 *Audio VU meter levels*

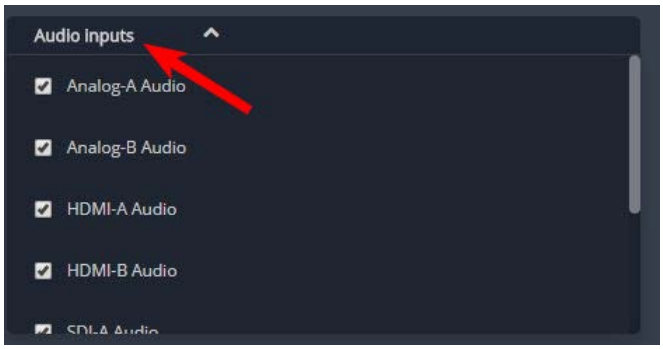
Color	Decibel range
Red	0 to -9 dBFS
Yellow	-9 to -18 dBFS
Green	-18 dBFS and lower

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

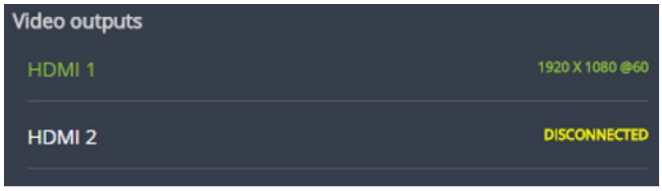
You can pick which audio inputs display in the Dashboard view. Just tap the **Audio inputs** header and then check the **checkbox** next to the name of each source you want showing in the Dashboard view. Tap **Save** when you're done. The Dashboard audio input list updates automatically.



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.



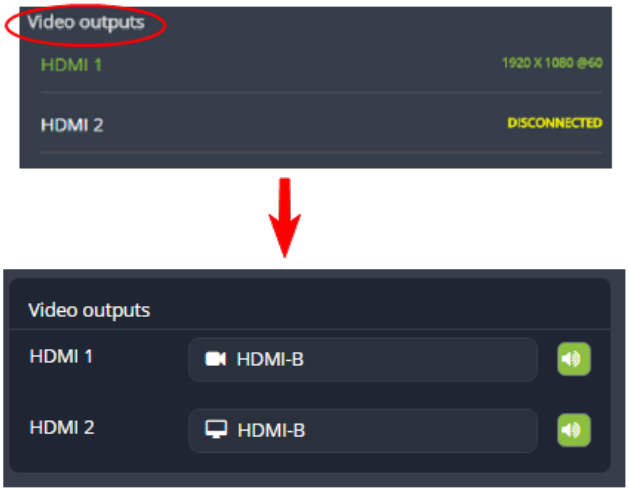
- **Green text** means your output is connected and transmitting to your external display.
- **Grayed-out text** means the output port is disabled.
- **White text** means the output port is enabled but is not connected to an external display.

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

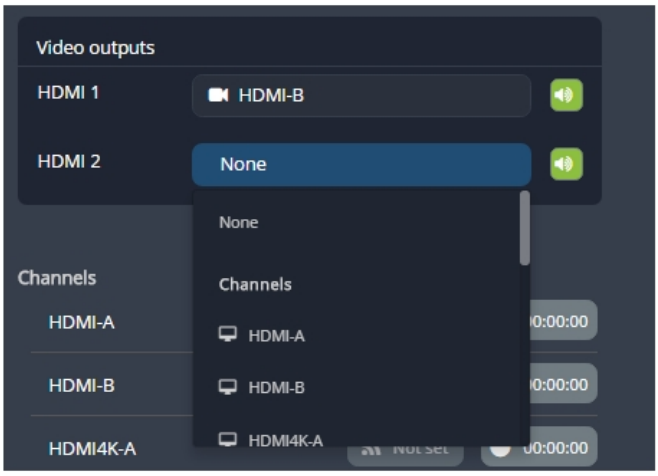
By default, video output ports are configured to maintain aspect ratio, use the display's default resolution, include audio at 100% and they don't include the audio VU meter. You can change these defaults in the Admin panel. See **Video output ports** to learn more about advanced-level video output configuration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

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

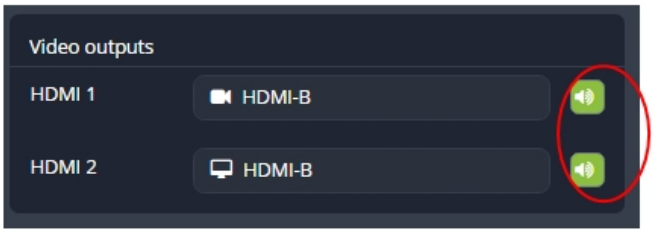
1. Tap **Video outputs** to display the video output configuration menu.



2. Tap the **text field beside the output port** and select a channel or source from the list.



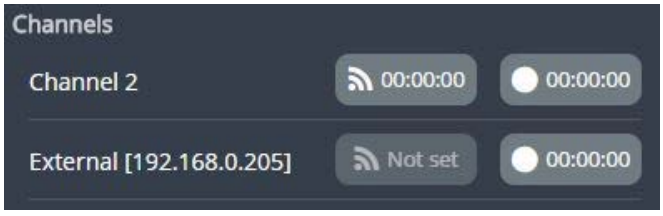
3. To enable or disable audio for the output port, tap the **speaker icon** to toggle audio On and Off for the port. A green icon means audio is enabled. A gray icon means audio is disabled.



Control streaming and recording

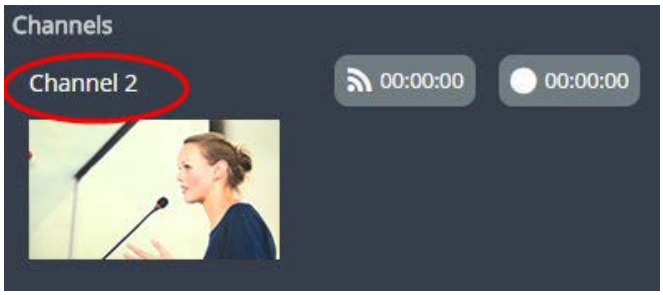
From the Epiphan Live Dashboard, you can control streaming and recording for channels using the buttons in the **Channels** section. When a channel is not currently streaming or recording, the buttons are gray and their respective timers are set to 00:00:00. If streaming isn't configured for a channel, 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.



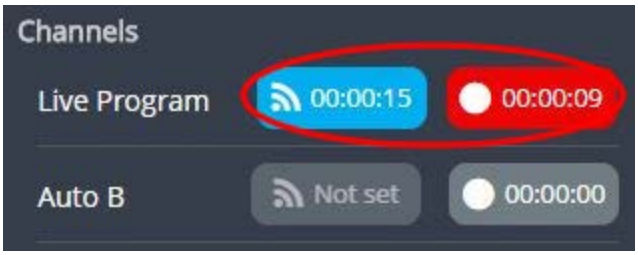
If multiple streams are configured for a channel, a pair of control buttons is displayed for each stream.

Click the channel name to open a preview thumbnail view.

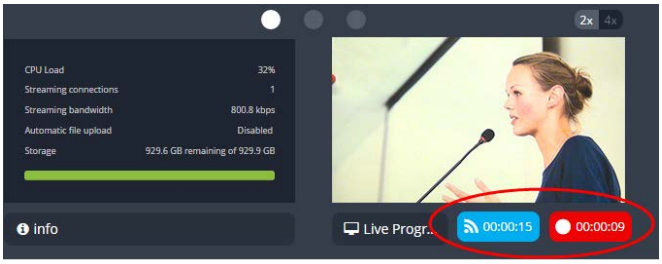


When you're ready to start streaming and recording the channel, tap the streaming and recording control buttons. Tap the buttons a second time to stop streaming and recording.

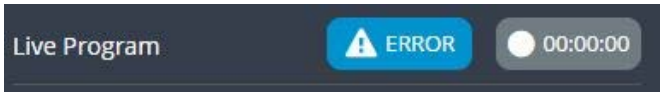
- The streaming button turns blue when the channel is streaming and the timer's clock increments.
- The recording button turns red when the channel is recording and the timer's clock increments.



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.



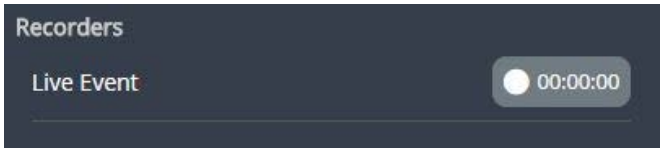
If the stream fails to publish, the streaming button flashes blue and displays "ERROR". Check the streaming settings for your channel using the Admin panel, see Streaming a channel directly to viewers.



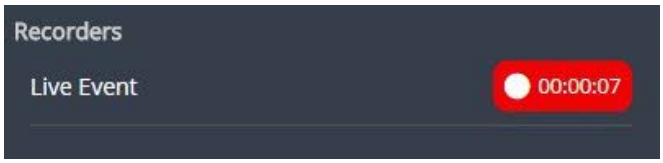
Recording using multi-track recorders

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-2.

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.

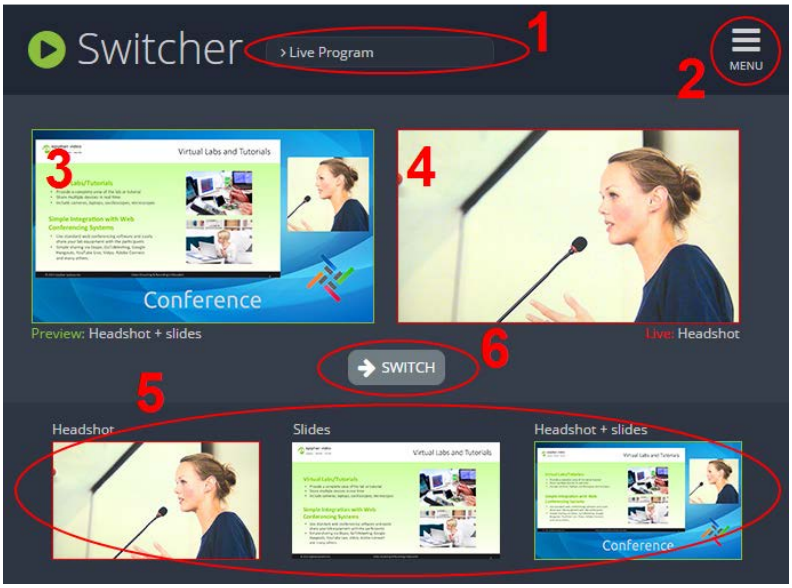


Table 16 *Elements in the Switcher view*

Number	Title	Description
1	**Channel selector**	A list of channels configured on your Pearl-2. 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**

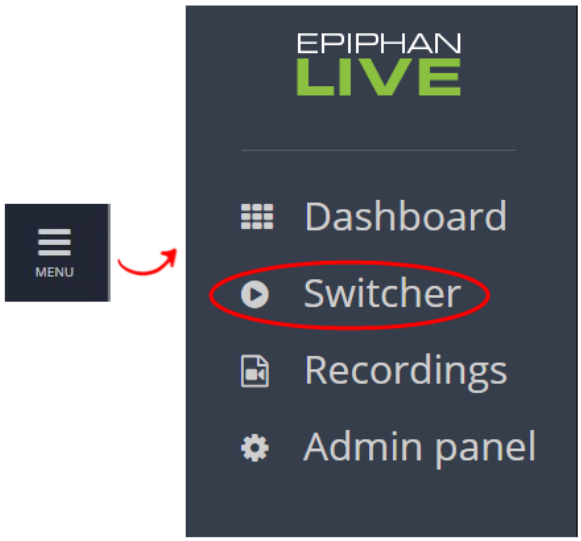
Number	Title	Description
		panel. Note that the layout selected for the **Preview panel** has a green border and the layout in the **Live panel** has a red border.
6	**Switch button**	When selected, the layout in the **Preview panel** replaces the layout in the **Live panel** and is immediately reflected in your active stream and recordings.

Switching while live streaming and recording using Epiphan Live

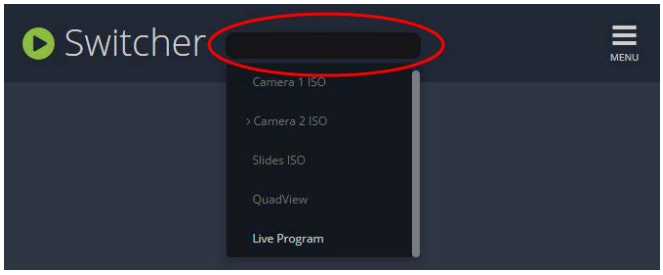
The Switcher interface lets you easily live switch between custom layouts with the simple press of a button.

To switch layouts while live streaming and recording:

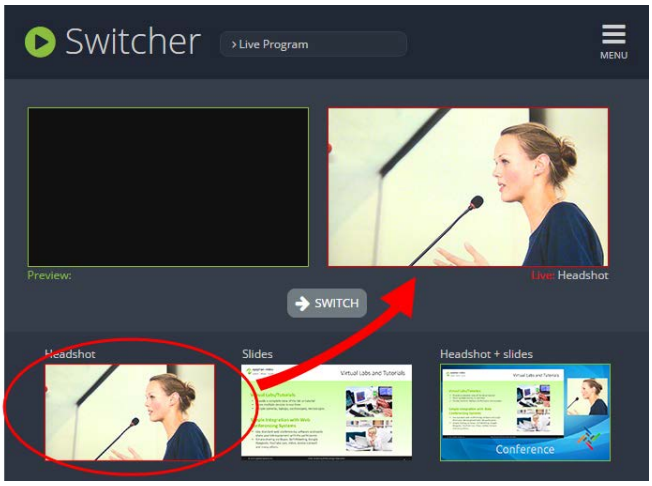
1. Log in to Epiphan Live. The Dashboard view opens by default. See Access Epiphan Live using a web browser or mobile device.
2. Tap the **Menu** icon in the upper-right corner of the Dashboard screen and tap **Switcher** to open the Switcher interface.



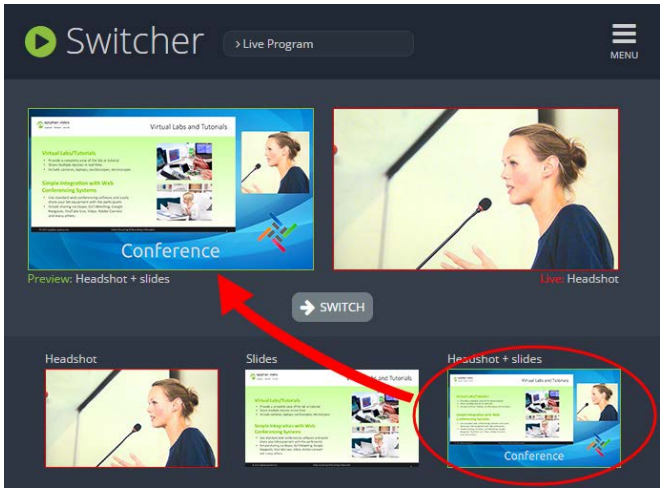
3. Tap the **field** beside the "Switcher" header and select a channel. The field is blank if this is your first time configuring the Switcher. Channels with only one layout are grayed-out and cannot be selected for switching.



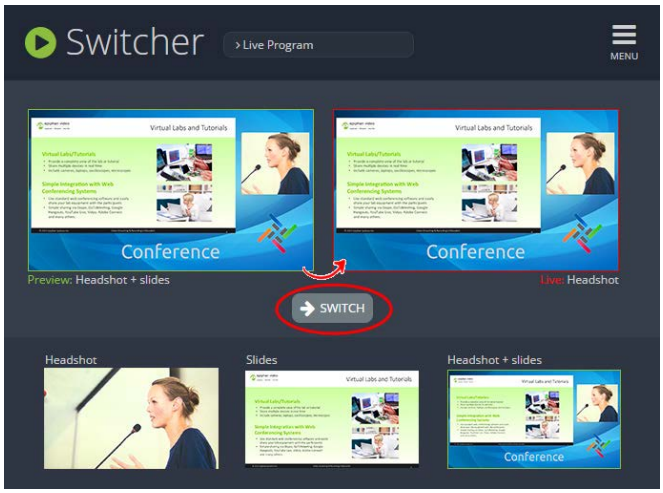
All the layouts for the selected channel are displayed in a carousel along the bottom of the screen. The layout that is live is displayed in the **Live panel** on the right side of the interface, see About the Switcher interface.



4. In the carousel, tap the layout that you want to switch to next. That layout displays in the **Preview panel**.

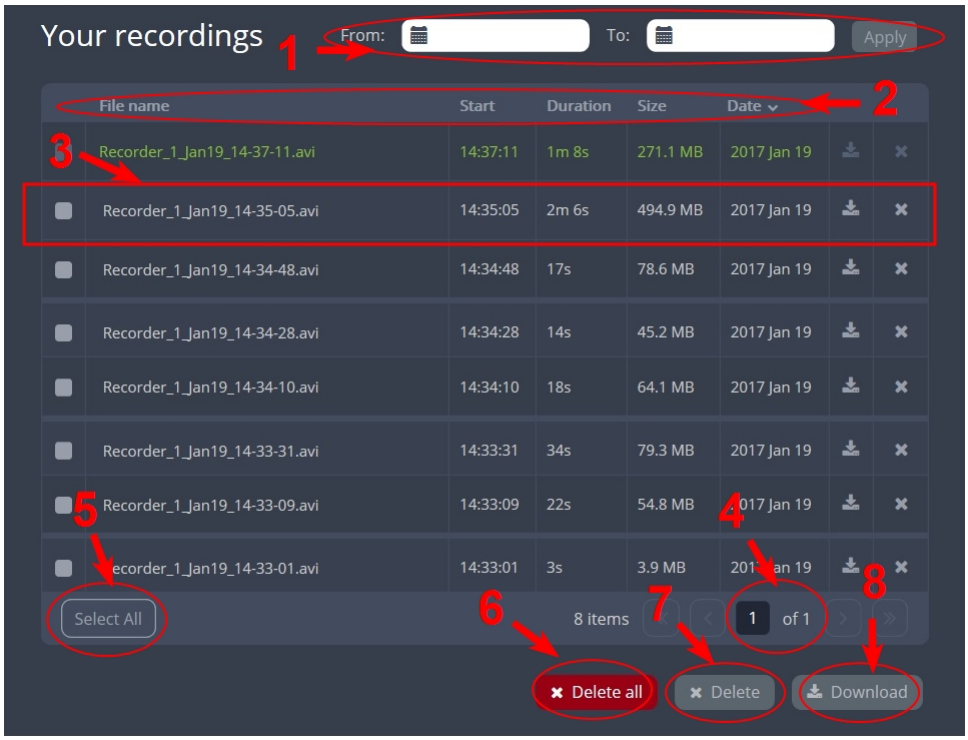


5. Tap the **Switch** button to move the layout that is currently in the **Preview panel** to the **Live panel**. Load another layout into the Preview panel so that it's ready to go live the next time you tap **Switch**.



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-2 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-2.

Topics include:

- Rackmount installation
- Configure network settings
- Tether to a mobile network
- Configure date and time
- Audio input ports
- Video output ports
- Feature add-ons
- Configuration presets
- User administration
- Status and monitoring

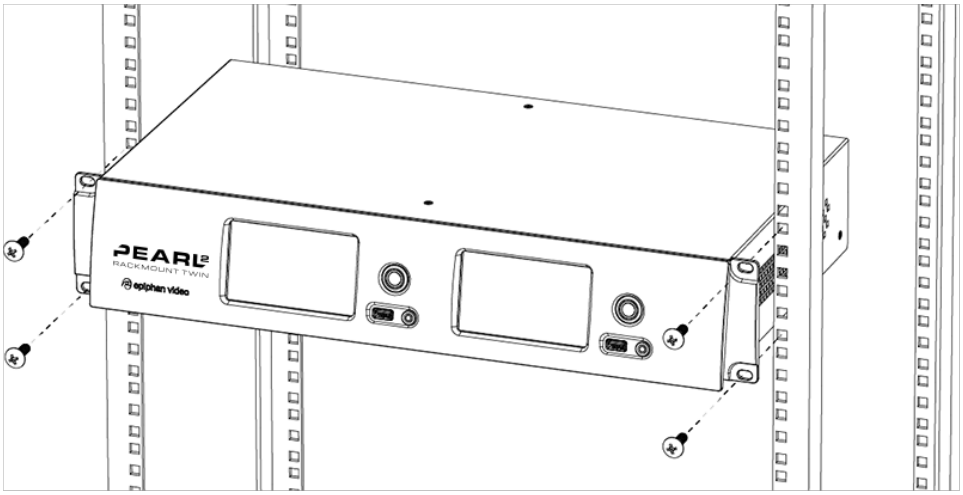
Rackmount installation

All Pearl-2 models can be used in desktop mode, with the system placed on any flat, stable surface. They are also all rackmountable into fixed racks or portable rack cases like the one depicted below.

If you purchased Pearl-2 Rackmount or Pearl-2 Rackmount Twin, you can install your system directly into a 19-inch rack. For the smaller, portable Pearl-2 model, you can purchase our optional rackmount shelf for installation in a rack. (Instructions for the rackmount shelf are included with the shelf.)

To install Pearl-2 Rackmount or Pearl-2 Rackmount Twin in a 19-inch rack:

1. Ensure you have the correct bolts needed for your rack (not included). Pearl-2's rackmount holes are sized to work with both threaded and non-threaded mounting systems.
2. Carefully slide the system into and available 2U space in your 19-inch rack.
3. Attach four bolts as shown below.



Configure network settings

Pearl-2 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-2
- Verify IP address and MAC address of Pearl-2
- Configure a static IP address
- Configure DHCP
- Tether to a mobile network
- Perform network diagnostics

Network ports used by Pearl-2

The following table lists the default incoming and outgoing network ports that Pearl-2 uses.

Do not block traffic over these ports. If you want Pearl-2 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 17 *Default incoming network ports for Pearl-2*

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	HTTP for the Admin panel, HLS streaming if enabled. See Stream content using HLS (HTTP).
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

Port (or range)	Protocol	Description
		whether they are using RTSP/TCP, RTSP/HTTP or RTSP/UDP. 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-2, 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-2 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-2

There are two ways to view the current IP address and MAC address of your Pearl-2:

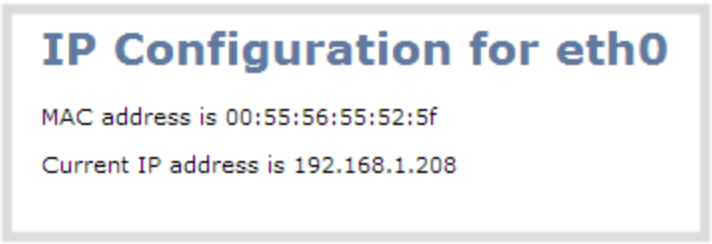
- From the Network configuration page using the Admin panel.
- From the Settings menu using the touch screen on Pearl-2.

Table 18 *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-2 supports IPv4 addresses. It does not support IPv6 addresses.

To view network information using the Admin panel:

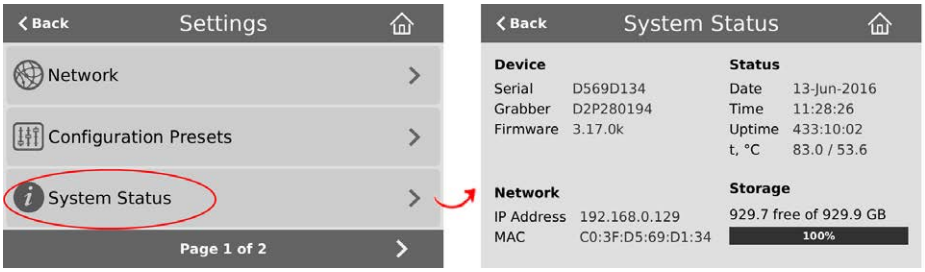
1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Configuration menu, click **Network**. The network configuration page opens.



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-2 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-2

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-2 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.

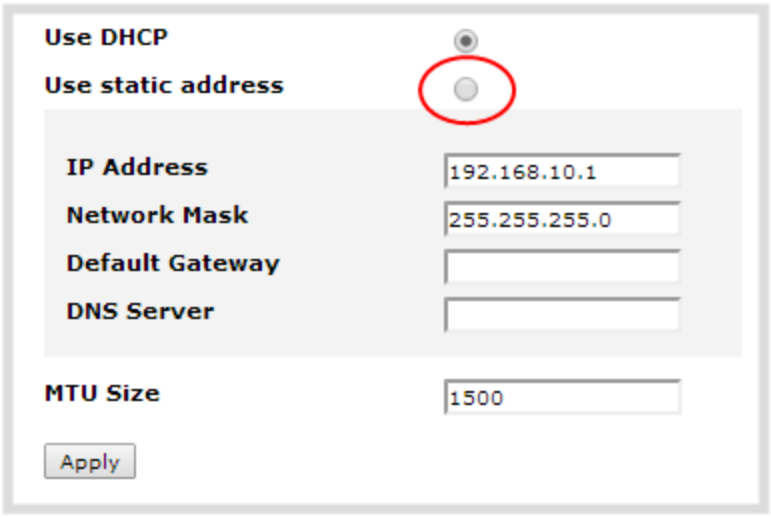


Table 19 *Static IP Address Fields*

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-2 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 by Ethernet at the network layer. It's best for all nodes in your network to use the

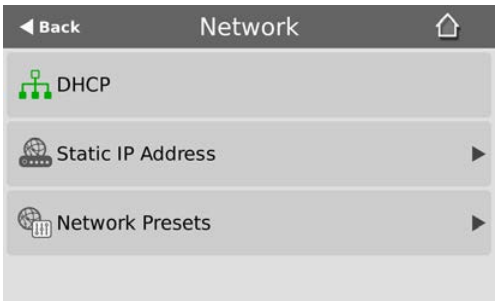
Label	Description
	same value. Only change the MTU value if you know that other nodes use a different value.

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.

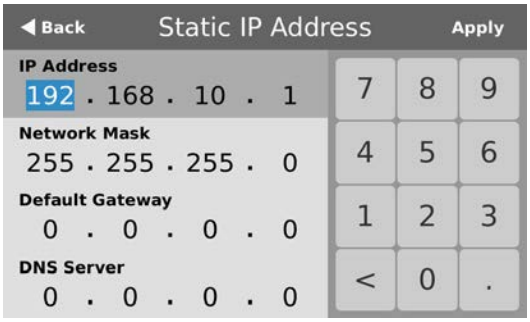
4. Reboot Pearl-2 when prompted. From the Configuration menu, select **Maintenance** and click **Reboot Now** on the Maintenance page.
5. After the system has finished rebooting, use the new IP address to log back in to the Admin panel as **admin** and verify that all changes were applied.

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

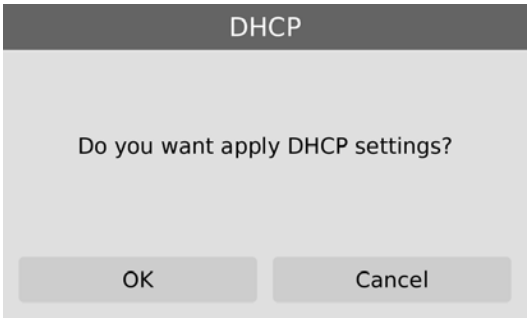
If you need to switch Pearl-2 from using static IP address allocation to using dynamic allocation with DHCP, you can do this three different ways:

- 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 20 *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-2 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.

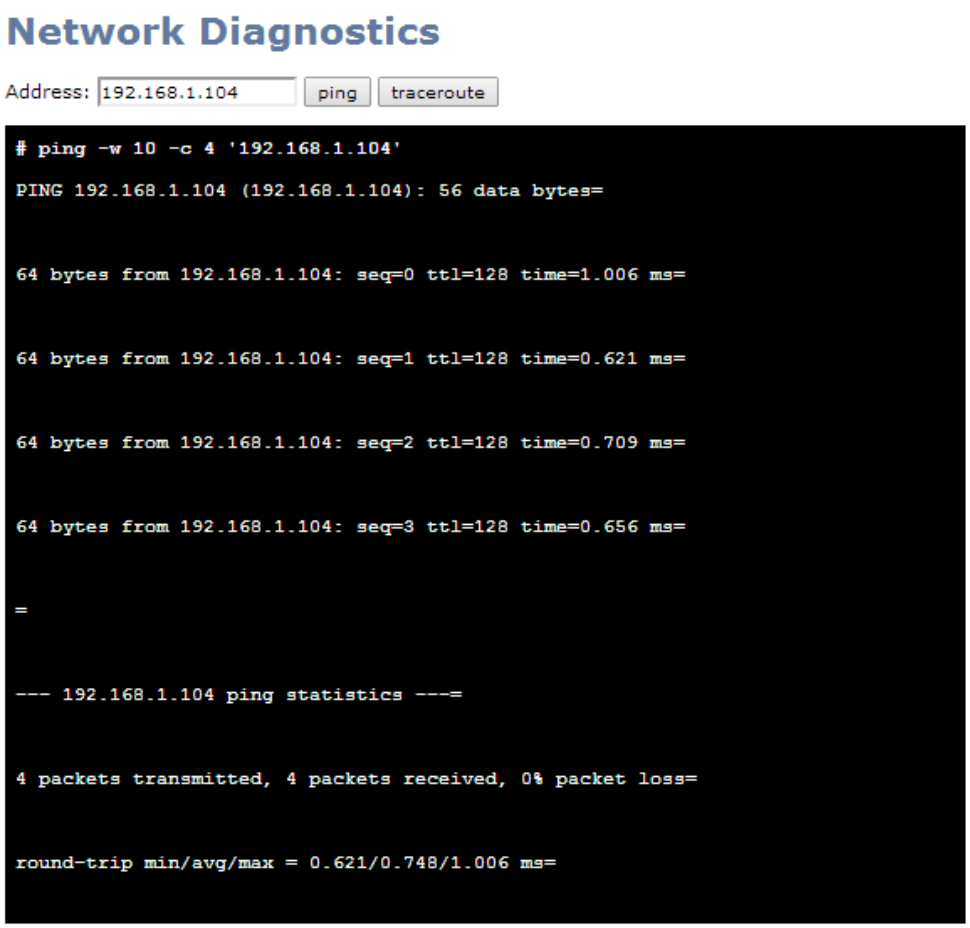
Perform network diagnostics

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-2 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-2; 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-2 into the **Address** field and click **ping** or **traceroute**. The console-like results are displayed below the Address field.



Tether to a mobile network

Pearl-2 supports tethering to a mobile device over USB. You can use tethering to access a mobile hot spot for live streaming, or have the tethered mobile network on standby as a backup network for your Ethernet connection (or use the Ethernet connection as the backup for your mobile hot spot).

Here's how network failover works.

You can choose to prefer the Ethernet network or the tethered (i.e. mobile hot spot) network. If the preferred network connection goes down, Pearl-2 switches to the backup network. For example, if you chose the Ethernet network as your preferred network, you will switch over to the tethered mobile network if the Ethernet network fails.

When the failover happens, Pearl-2 is assigned a new IP address and all streaming sessions with viewers, clients or servers that are directly connected to Pearl-2 are closed. You must provide viewers, clients and servers with the new IP address so they can reconnect with Pearl-2.

If you have shared Pearl-2's stream URLs with viewers who are connected directly to the channel over the network and a failover happens, their stream ends and you must provide them the new stream URL with the new IP address. You can get the new stream URL from the channel information page, see **View supported streaming formats**

By contrast, actively published streams to CDNs are closed and reconnected via the secondary network (mobile or Ethernet) automatically, as long as the publishing server is accessible from the new network. However, be aware that some publishing servers (such as Facebook and YouTube), will end the live streaming session if the stream drops.

AFU to a connected USB memory device does not copy recorded files to the connected memory device when USB tethering is configured as the preferred 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-2 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 21 *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.

Configure date and time

Pearl-2 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-2:

- From the Date and Time page using the Admin panel.
- From the Settings menu using the touch screen on Pearl-2.

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.

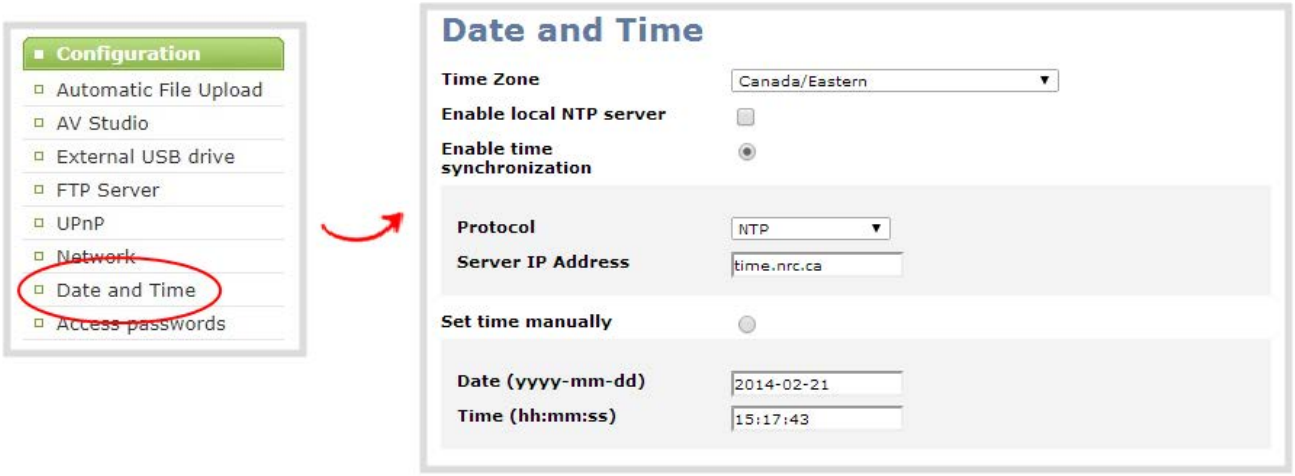


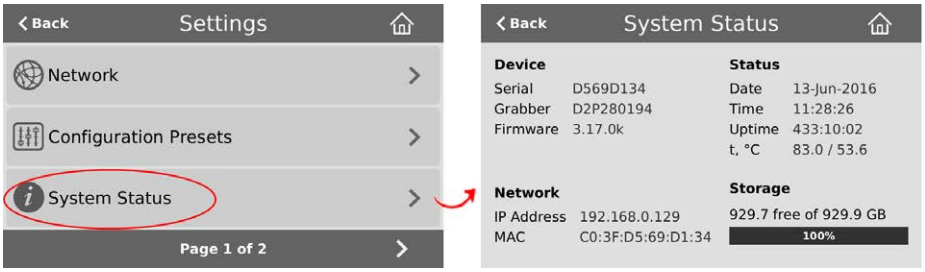
Table 22 Date and Time configuration options

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. 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 time server

Pearl-2 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-2 supports.

Table 23 *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-2. 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-2 and PTP sends UDP packets over ports 319 and 320. If Pearl-2 is behind a firewall, you must open these ports to allow traffic when Pearl-2 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-2:

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 24 *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-2 uses NTP for time synchronization by default. However, you can manually set the date and time for Pearl-2 using the Admin panel. You can also set the time zone. Pearl-2 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**.

Audio input ports

You can connect external audio devices like audio mixers directly to the audio input ports on Pearl-2. There are:

- Four XLR professional line-level inputs + 4.0 dBu up to 12.3 V (RMS), (+24 dBu) that support balanced and unbalanced signals.
- One stereo pair RCA consumer line-level input (-10 dBV)
- Two USB video/audio ports
- Four HDMI ports
- Two SDI ports

The four XLR audio inputs are configured as two stereo pairs by default: XLR A (left/right) and XLR B (left/right). The XLR B audio ports and the RCA audio ports are linked. You can configure Pearl-2 to use both or just one of the audio sources using the Admin panel.

Topics include:

- Configure audio ports for stereo or mono
- Assign audio sources to an input
- Adjust audio gain and delay
- Mute audio

For details about the audio inputs, see AV inputs.

Configure audio ports for stereo or mono

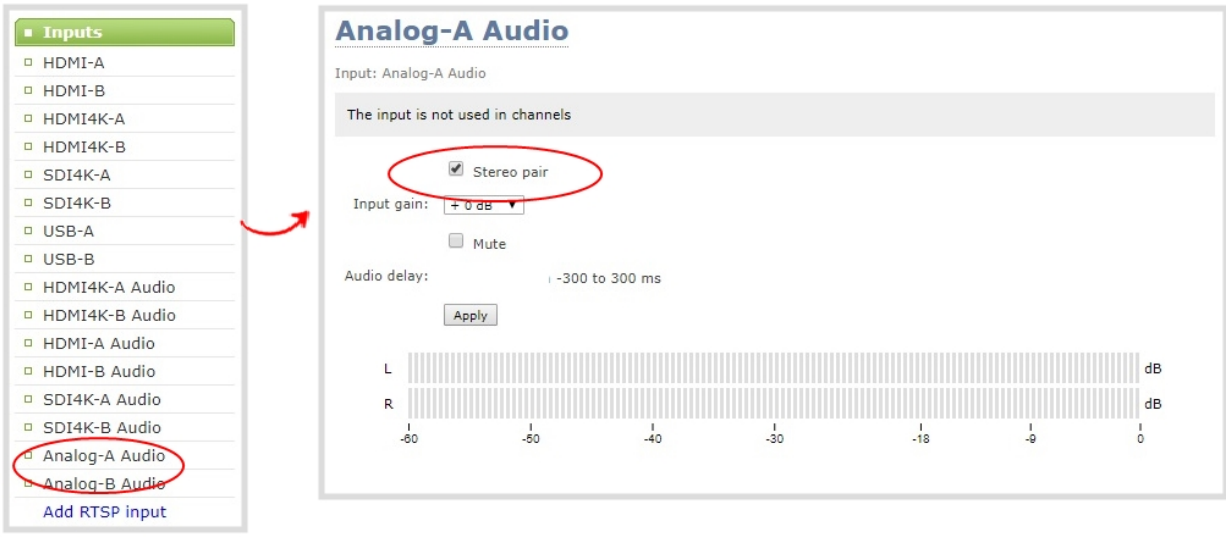
The four XLR professional line-level inputs are configured as two stereo pairs by default: XLR A (left and right stereo pair) and XLR B (left and right stereo pair).

Using the Admin panel, you can configure these ports to function as a stereo pair (left/right) or as 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 **Analog-A Audio** for the XLR A ports or click **Analog-B Audio** for the XLR B ports. The configuration page for the audio ports opens.

3. Do one of the following.
    a. To make the ports function as a stereo pair, check **Stereo pair** and click **Apply**.
    b. To make the ports function as separate mono ports, uncheck **Stereo pair** and click **Apply**.



When mono is selected, two sets of parameters and two audio VU meters appear on the configuration page - one for each audio input port on Pearl-2. Parameters that are listed only once on the page applies to both ports.

Assign audio sources to an input

Some audio input ports share internal audio processing resources in Pearl-2. These shared audio sources appear in the same configuration menus in the Admin panel and appear under the same audio input label in the user interfaces.

The audio sources that share resources are:

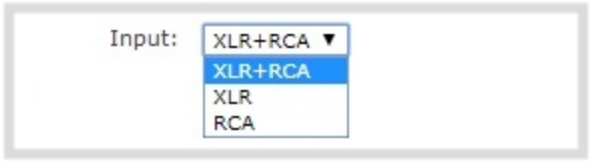
- RCA (left and right ports)
- 3.5 mm (stereo port)

Both the RCA and 3.5 mm audio sources appear under the label **RCA/3.5 mm Audio**. You can assign one or both audio sources to **RCA/3.5 mm Audio**. Choosing one audio source for the shared input disables the other audio source. This means that when you select RCA/3.5 mm Audio as the audio source for a layout using the custom layout editor, only the audio source you assign to RCA/3.5 mm Audio is used. Both audio sources are assigned by default.

To assign the audio source to an input:

1. Login to the Admin panel as **admin**. See Connect to the Admin panel.
2. From the Inputs menu, select the shared audio source. The audio configuration page opens.

3. From the **Input** menu, select the audio source and click **Apply**.



Adjust audio gain and delay

Pearl-2 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.

The analog audio input ports on Pearl-2 are calibrated for +4.0 dBu XLR or -10.0 dBV RCA audio signals and provide moderate to significant signal headroom. For the analog audio inputs, you can add up to +30 dB of gain using the Admin panel.

If the gain of your analog audio signal needs adjustment, monitor the audio levels using the VU meter and headphones, then add some gain using the Admin panel. As a rule, each 10 dB of gain doubles the perceived loudness of the audio signal.

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

Microphones typically have low audio signals (less than -30 dBu) and are not supported directly as inputs to Pearl-2. Use an audio mixing board or preamp to amplify microphones and supply the appropriate line level input. See **Connecting microphones to the XLR line level inputs**.

This table offers some guidelines for adjusting the gain at the audio input port of Pearl-2 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.

Table 25 *Audio input port gains guidelines*

Audio source	Input port	Gain
Mobile phone or other consumer line level device	XLR	Add +6 to +12 dB gain to the audio input port.
	RCA	Nominal
Professional mixer	XLR	Nominal
	RCA	Not recommended.
USB microphone	USB	Nominal
Dynamic, condenser, or electret microphones	XLR	Not recommended. To connect microphones to the pro line level XLR inputs, you must use an external preamp to boost the microphone signal enough to provide the proper line level signal at the XLR input port, see Connecting microphones to the XLR line level inputs.

Ensure the audio input source is connected to an analog audio input port on Pearl-2 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**.

Mute audio

You can mute any audio input port using the Admin panel. For analog audio ports that are configured as mono inputs, you can mute each port separately.

Some audio input ports share internal audio processing resources in Pearl-2. Muting an audio input that shares internal resources mutes all the associated audio sources. The following table lists the audio input ports that share internal processing and the results of applying mute.

Table 26 *Muting audio inputs that share resources*

Audio input (Admin panel)	Shared audio input resources	Results
Analog-B Audio	XLR-B (left/right) RCA (left/right)	**In stereo mode:** Both XLR-B ports (left and right) are muted. Both RCA ports (left and right) are muted
		In mono mode (Analog B audio Left muted): Both the XLR-B left and RCA left ports are muted.

Audio input (Admin panel)	Shared audio input resources	Results
		The XLR-A right and RCA right ports are not muted.
		In mono mode (Analog B audio Right muted): Both the XLR-B right and RCA right ports are muted. The XLR-A left and RCA left ports are not muted.

To mute 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. Check **Mute** to mute the audio source or uncheck **Mute** if you no longer want the audio source muted.

4. Click **Apply**.

Video output ports

Video output ports on Pearl-2 let you connect external displays for confidence monitoring. You can use the Admin panel or the touch screen on Pearl-2 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

Pearl-2's rear panel includes two HDMI video output ports. HDMI 1 is set to show Auto A and HDMI 2 is set to show Auto B by default. Both video output ports are 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 using the video output port for confidence monitoring, some delay can be expected. For a 1080p video source, the average delay on the video output port is approximately 100 ms. For a 1080p channel, the average delay on the video output port is approximately 300 ms. The actual amount can vary, depending on the setup.
- 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-2 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 for your video output ports, but you can also change settings to allow a variety of other resolutions through.

Aspect ratio legend

Aspect Ratio	Common Use
4:3	Standard TV (NTSC/PAL) display and non-widescreen computer displays
16:9	Widescreen (HD) TV displays (1080p, 1080i, 720p etc), and 4K-capable displays
16:10 (8:5)	Widescreen computer displays, and 4K-capable displays
5:4	Sometimes used in larger format computer monitors
1.90:1	Digital Cinema Initiatives standard resolution for 4K or 2K video projection

Resolutions

640×360	640×480	960×540	1024×768
1280×720	1280×1024	1600×1200	1920×1080
1920×1200	2560×1440	3840×2160 4K	4096×2160 4K

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**).

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, 3840×2160[4K] , 4096×2160[4K]	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.

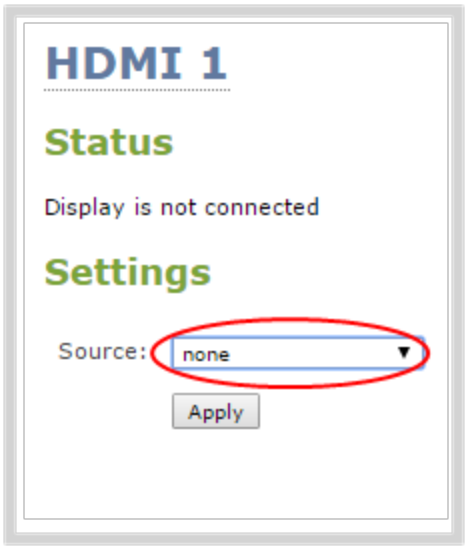
Disable the video output port

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**.



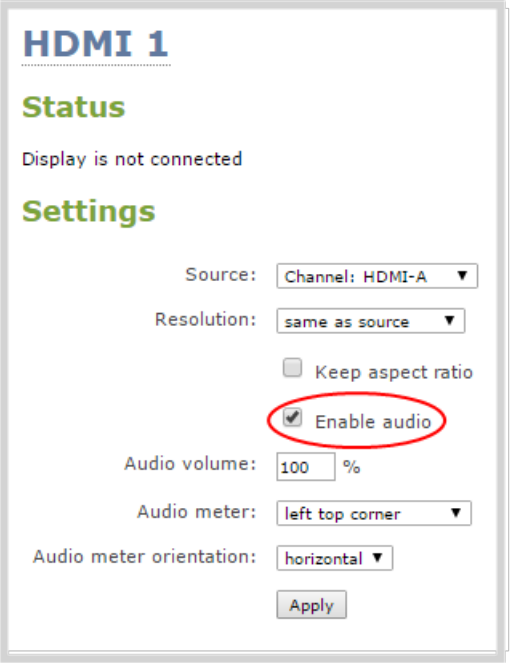
Disable or enable audio and output port volume

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.



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.

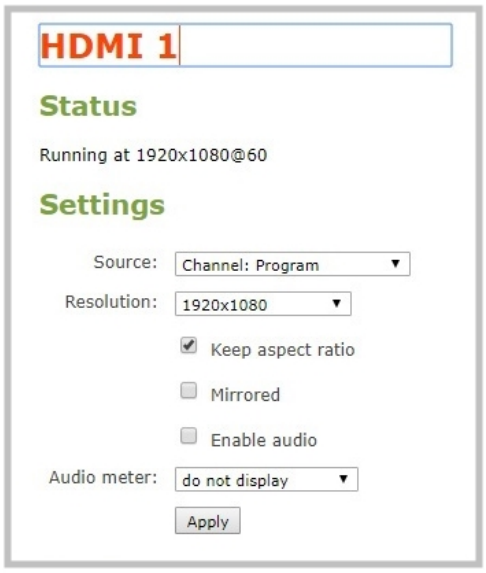
4. If you've selected a location for the audio meter, you can also select an orientation (horizontal or vertical) in the **Audio meter orientation** field.
5. Click **Apply**.

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 and HDMI 2 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.

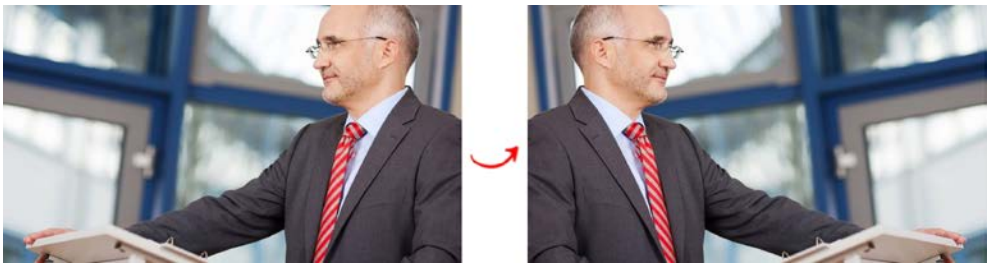


4. Press **Enter** using your keyboard to save the changes.

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

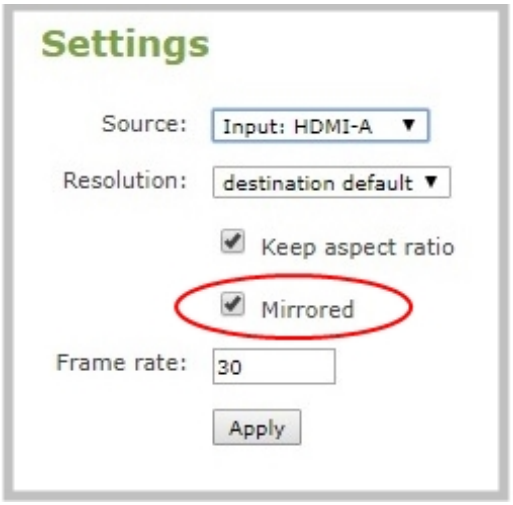
Mirror the video output port display

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**


Settings
Source:
Input: HDMI-A
Resolution:
destination default
Keep aspect ratio
Mirrored
Frame rate:
30
Apply

Feature add-ons

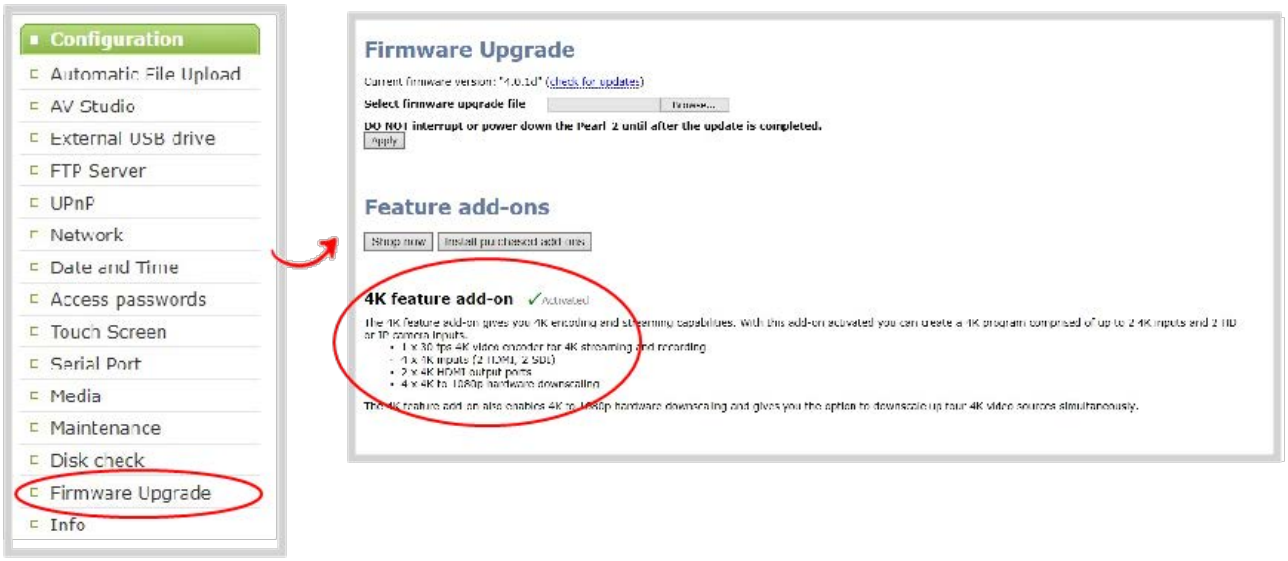
Pearl-2 offers add-on features so you can do even more with your system. Start from the base model of Pearl-2 and add feature add-ons for extra functionality.

See Add-ons overview for details about the availability of add-ons for your system, as well as instructions to purchase and install add-ons.

Where you see this symbol 4K in the guide, that means the feature or function applies only if you have activated the 4K feature add-on.

Add-ons overview

Pearl-2 add-ons are listed in the Admin panel when you click Firmware upgrade from the Configuration menu. A 4K feature add-on shows the name and description for each feature add-on that is available for purchase and installation.

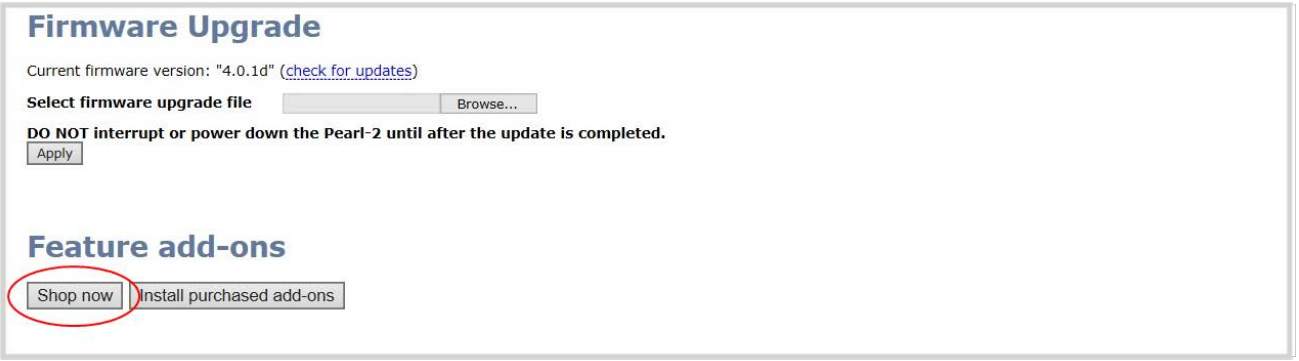


Add-ons must be purchased, installed, and activated before their features can be used. If you have already purchased an add-on either on our site at epiphan.com/add-ons or have purchased the full version of Pearl-2, you can go ahead and click **Install purchased add-ons** to activate the feature. A system reboot is required. If you want to purchase an add-on, follow the process outlined below.

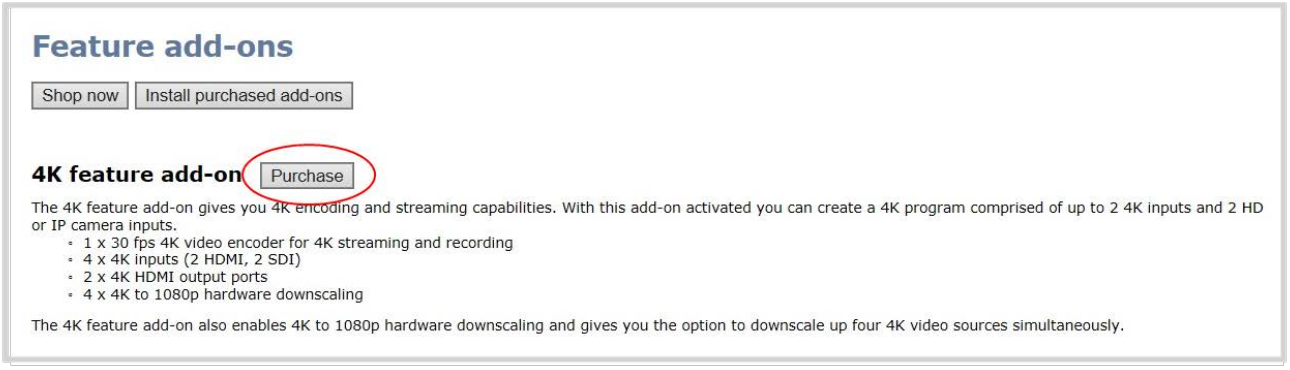
Shop now

You can go to the add-ons store page on the Epiphan website at epiphan.com/add-ons to purchase feature add-ons or navigate there from the Admin panel.

From the Firmware Upgrade page in the Admin panel, click **Shop now** to go to the add-ons store page to select and purchase available add-ons.



You can also click **Purchase** beside any feature add-on that's listed on the Firmware Upgrade page to go to the epiphan.com website and purchase that specific feature.

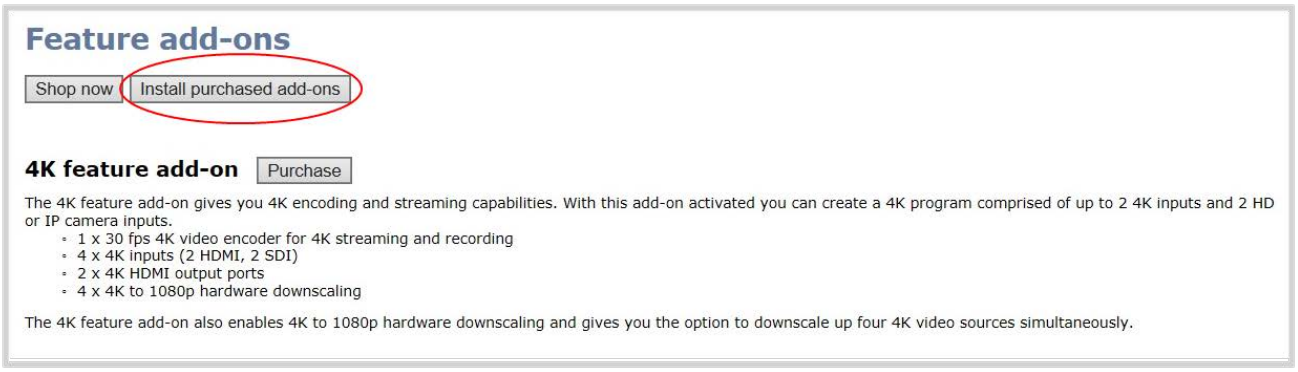


Install purchased add-ons

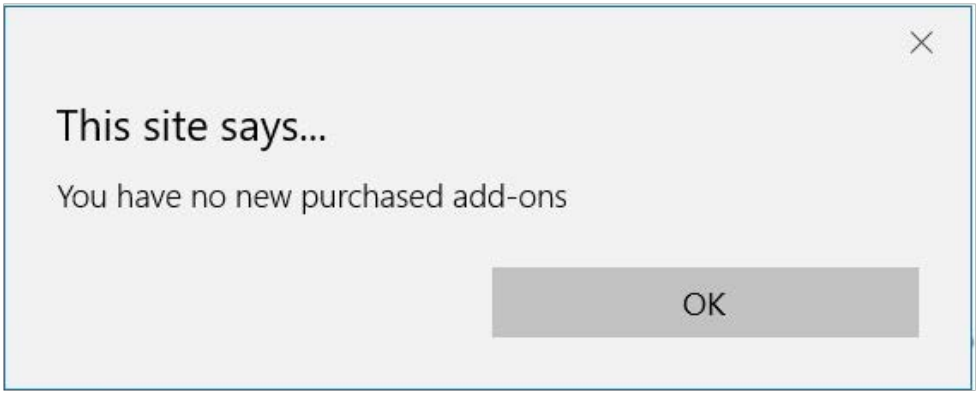
After you've purchased one or more feature add-ons, you must install and activate it before you can use the features. For Pearl-2 Rackmount Twin, you only need to purchase the add-on once, but you must perform the install and activation process for each system.

To install purchased add-ons:

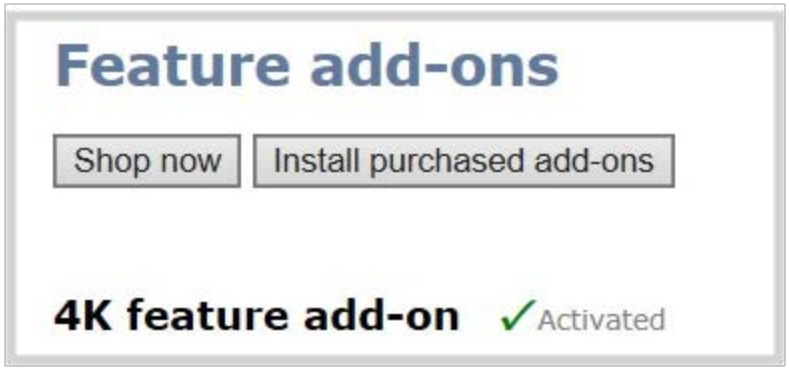
Click **Install purchased add-ons** from the Firmware Upgrade page to start the installation process. A system reboot is necessary to activate add-ons. Click **OK** when prompted. If you click **Cancel**, Pearl-2 installs the add-on but does not reboot. The add-on is not activated until Pearl-2 is rebooted.



Even if you have already purchased a feature, the **Purchase** button remains next to the feature until you have activated the feature and the system is rebooted. To determine if a feature with a **Purchase** button next to it has already been purchased, click **Install purchased add-ons**. If no add-ons are ready to be activated and installed, a message appears.



After you've activated your feature add-ons and the system reboots, the Purchase button beside those features is replaced by an Activated indicator.



Current list of add-ons

As of firmware 4.0.1, the 4K feature add-on is the only add on available for Pearl-2.

4K feature add-on

If you have the base model of Pearl-2, you can add the 4K feature add-on.

The base model of Pearl-2 supports:

- Six simultaneous full HD video inputs (4 x HDMI and 2 x 3G-SDI)
- 6 x 1080p 30 fps encoding (or equivalent)
- XLR and RCA audio inputs with built-in attenuation

The 4K feature add-on gives you access to the base model features, plus:

- 4 x 4K video inputs (2 x 4K HDMI and 2 X 4K SDI)
- 4 x 4K hardware scaling (4K down to full HD)
- 2 x 4K video outputs (HDMI)
- 1 x 4K video encoding

You can find more details on the add-on, along with installation instructions and the add-on itself, at www.epiphan.com/add-ons.

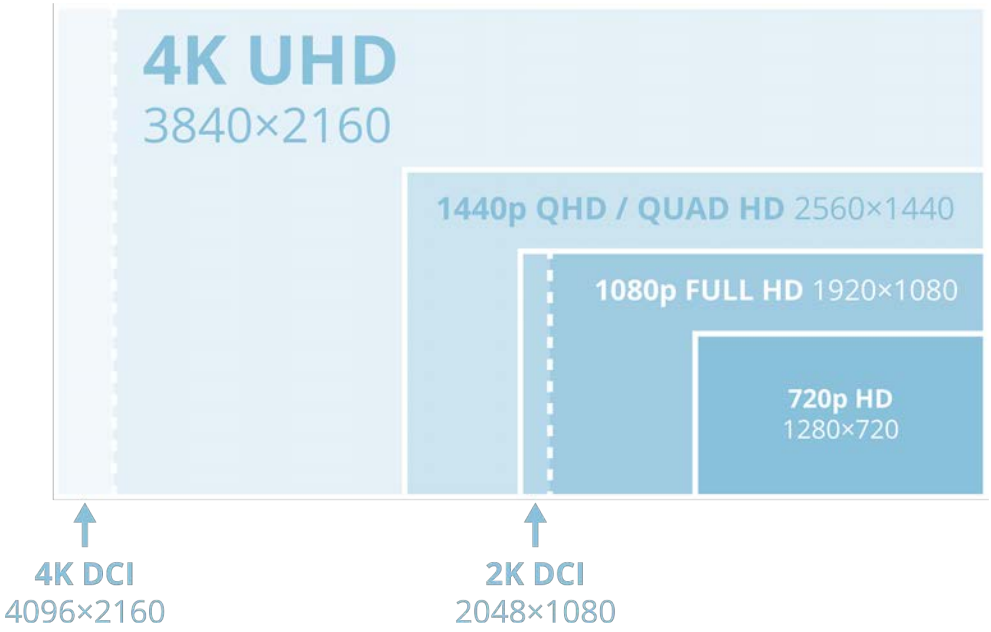
Activating your 4K add-on might not be necessary, depending on the version of Pearl-2 you purchased. As the first Feature Add-on, the 4K add-on was included automatically in some systems. If you purchased the full version of Pearl-2 or an early copy with firmware 4.0.0, the 4K add-on was included with your purchase and is automatically activated, so in those cases no action is required.

About 4K on Pearl-2

Pearl-2 supports resolutions from low-res SD to 4K, which means that you can use Pearl-2 to capture both DCI 4K and 4K UHD digital signals. You need the 4K feature add-on to access this feature, see Add-ons overview.

DCI 4K and 4K UHD are just different definitions of a 4K resolution. 4K UHD (3840×2160) is the standard 4K resolution available on televisions and other common display screens. The 4K resolution of 4096×2160 is referred to as Digital Cinema Initiatives (DCI) 4K, and is the resolution used almost exclusively for cinema-scale

film production. It is rare to find this resolution outside of a cinematic context. Pearl-2 is capable of supporting input and output at either definition with the Feature add-ons.



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-2 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-2 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-2.

Configuration presets let you quickly apply settings to your Pearl-2 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-2 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

Inputs

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-2 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-2 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-2. 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
- Disabling AV Studio remote login and presets with paired channels

Access to presets and privacy considerations

- Recorded files are not removed when you apply a configuration preset. Any user with access to Pearl-2 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.

Media files that you've uploaded to Pearl-2 (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.

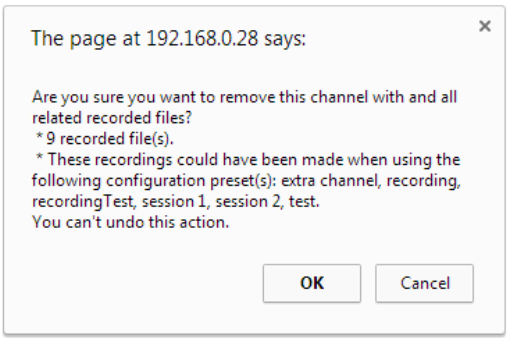
Furthermore, if you delete any of the recordings, you are deleting the *only* instance of those files. Using our previous example, if you delete one of the five recordings from channel index 1, you'll find that even after applying different presets channel 1 will have only four recorded files.

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.



Disabling AV Studio remote login and presets with paired channels

Do not create configuration presets while a channel is paired to your AV Studio account. Disabling AV Studio using the Admin Panel and then applying a preset that was created when the channel was paired causes an incorrect paired state in the Admin Panel. The channel's paired state in the Admin Panel shows the channel as paired but the actual status in AV Studio is permanently offline and unpaired. You must delete the encoder in AV Studio, disable and then re-enable the AV Studio feature using the Admin Panel to restore the channel to the correct status.

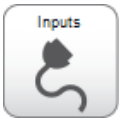
Deleting an encoder in AV Studio permanently deletes all uploaded recordings and renders associated with that encoder.

Configuration groups

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

Table 27 *Configuration group definitions*

Group Name	Symbol	Settings included in the configuration group
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 settings and tethering configuration.

Group Name	Symbol	Settings included in the configuration group
Inputs		All audio and video source configuration settings (including no signal images) except EDID settings, which are in their own group.
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		Automatic file upload type and parameters. SFTP/SCP **private keys** are included (in encrypted format) in the automatic file upload preset.
EDID		EDID settings for sources. (Applying configuration presets with this group automatically applies the included EDIDs. This process can take a while.)
Output ports		All configuration settings for the output ports.
Touch screen		Permitted touch screen use settings.

The **Factory default** configuration preset

You can apply the default factory configuration preset to Pearl-2, 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 28 *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	✓	✓

Item	Factory default configuration preset	Factory reset function
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	✓	✓
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.

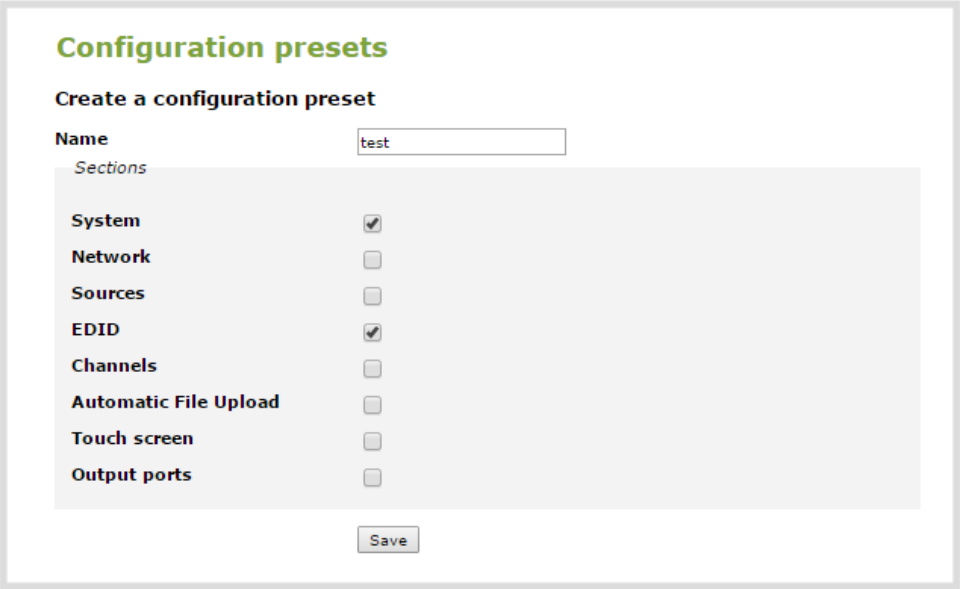
After you're finished configuring your Pearl-2, it's good practice to save a full backup with all groups selected so that you can restore your full configuration at a later date.

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

Do not create a configuration preset if you currently have a channel paired to your AV Studio account. Unpair all channels before you create a configuration preset.

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.

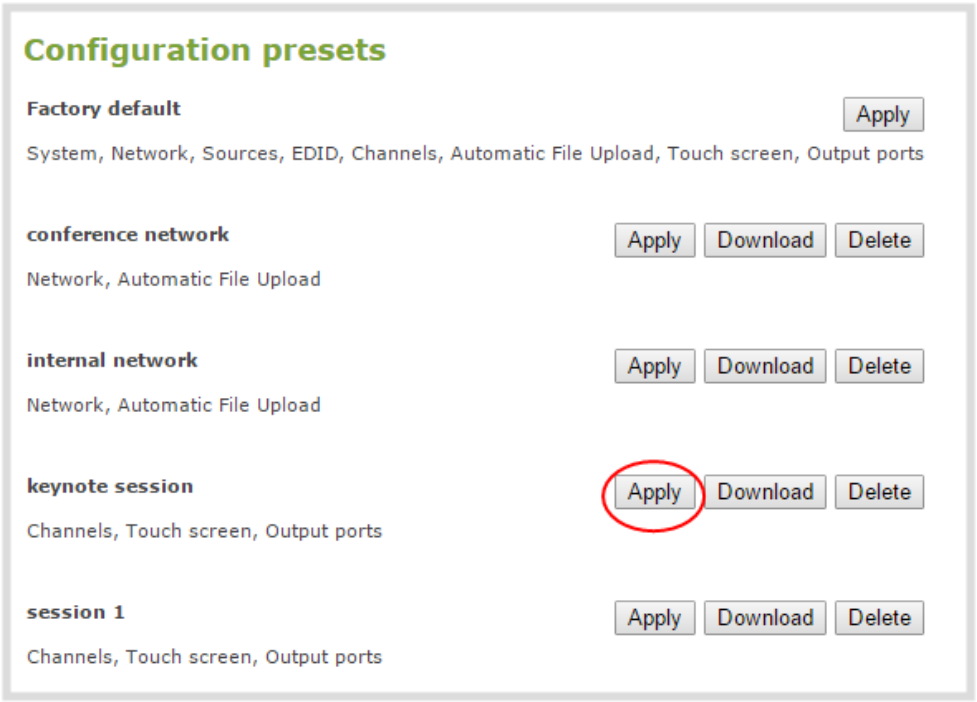
If you apply a preset that has the **network** or **system** configuration group, a reboot is required. If you apply a preset that has the EDID configuration group, the system may appear unresponsive for a short time while it applies these EDIDs to the video grabbers.

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-2 will reboot automatically if you pressed **OK** to apply the preset.

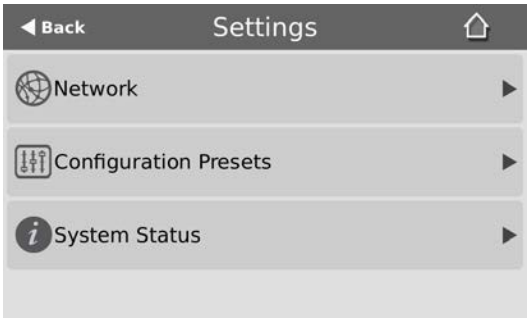
Apply a configuration preset using the touch screen

You can use Pearl-2'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.

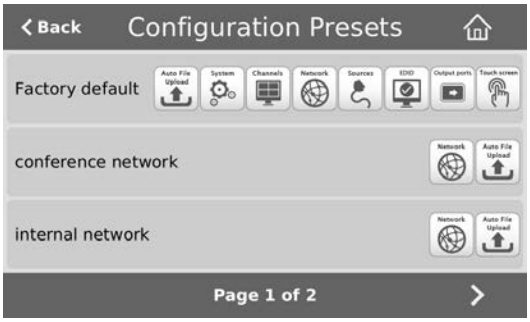
Configuration presets that only contain the **network** configuration group can also be applied using an alternative method, which is described at the end of this topic.

To apply a configuration preset using the touch screen:

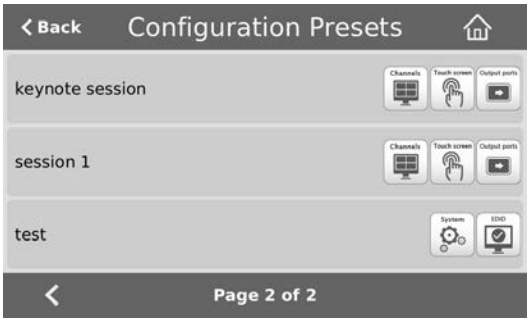
1. Tap the **gear** icon to open the System settings screen. If the control icons aren't showing, tap anywhere on the touch screen.



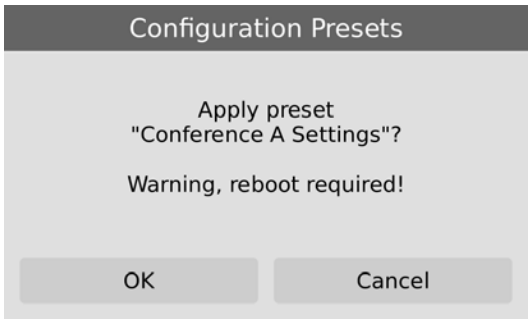
2. Tap **Configuration Presets**. A list of all the saved presets appears. The configuration preset to reset Pearl-2 to the Factory defaults is always listed first.



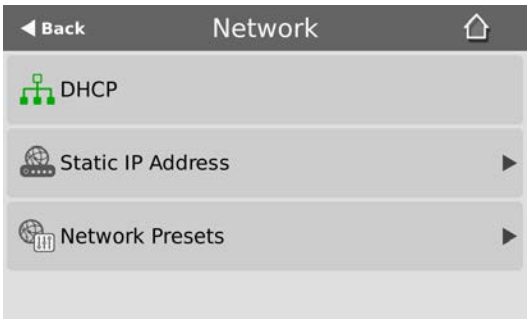
3. Use the arrows at the bottom of the page to navigate through the list and tap the name of the preset you want to apply.



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

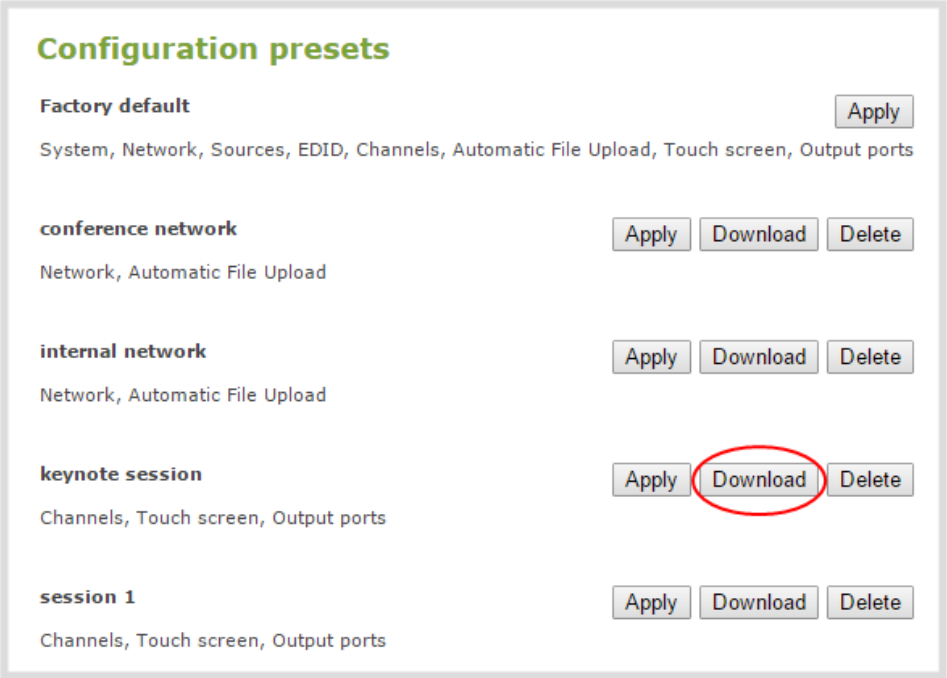
You can download configuration presets to your local computer, then upload and apply the preset to other Pearl-2 systems or save the configuration preset as a backup of your current configuration. Either way, it's a simple two-step process to download the preset from one system and upload it to another.

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).

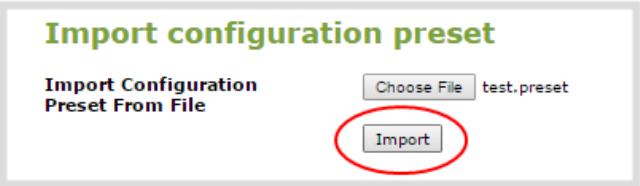


Import a configuration preset

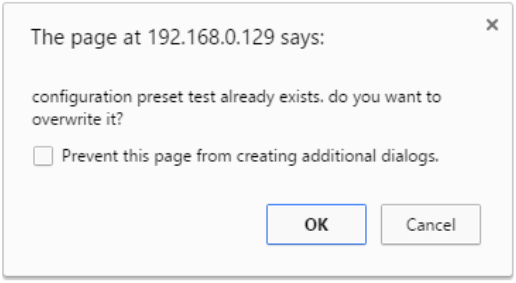
To import a configuration a preset:

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.



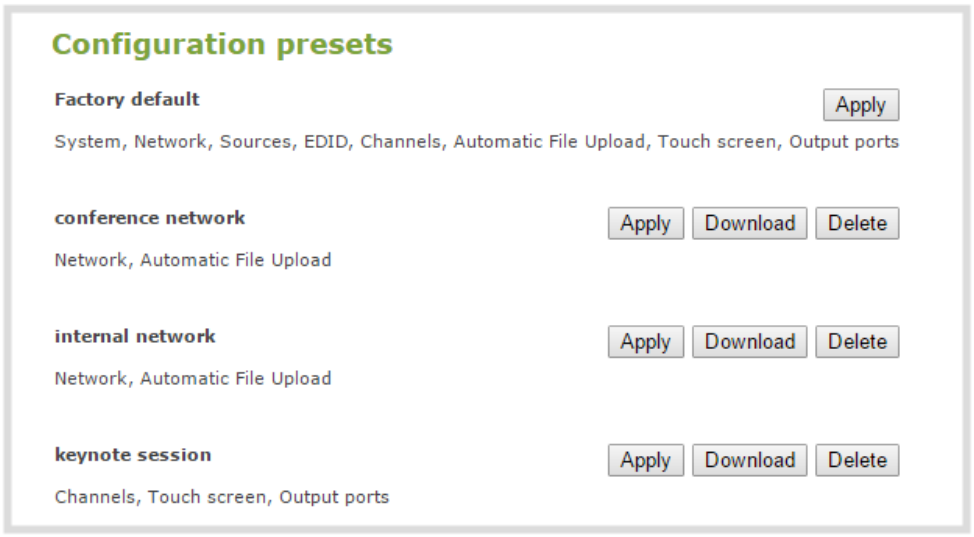
When a configuration preset file is uploaded it is not applied. To apply the configuration preset. See **Apply a configuration preset using the Admin panel** or **Apply a configuration preset using the touch screen**.

Update a configuration preset

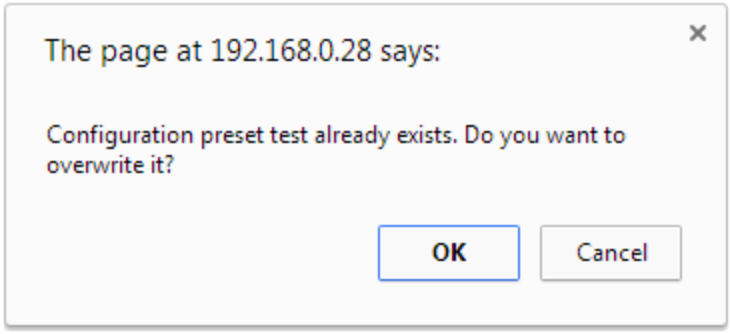
To update a configuration preset and add or remove different configuration groups using the Admin panel, you simply creating a new configuration preset with the same name so that it overwrites the existing one.

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.



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.

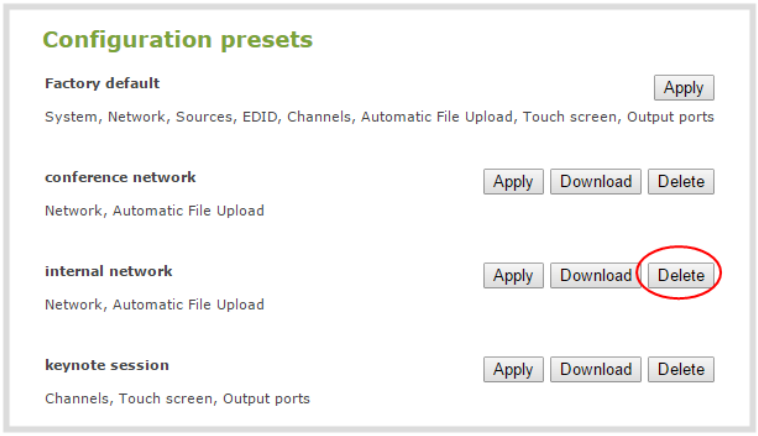


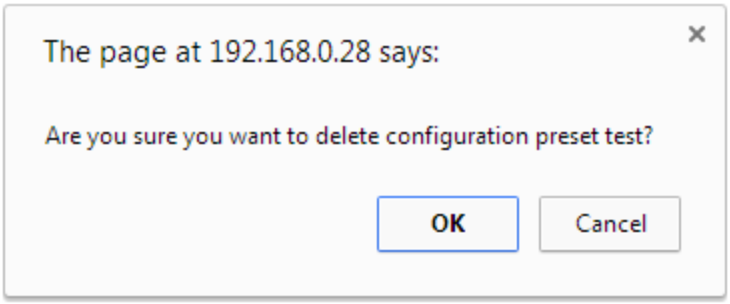
Delete a configuration preset

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.


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


The page at 192.168.0.28 says:
Are you sure you want to delete configuration preset test?
OK
Cancel

User administration

Pearl-2 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-2 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-2, 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-2 is **admin**.

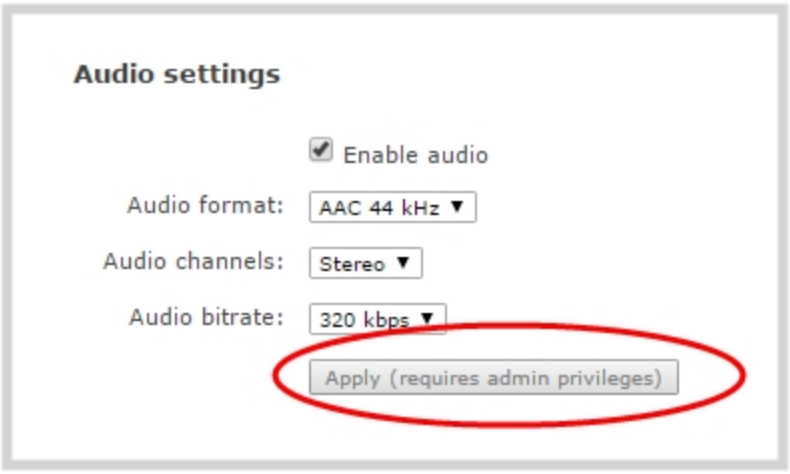
Operator

The **operator** account allows users limited Pearl-2 configuration control. The default user name used to log in to Pearl-2 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-2 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 29 *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			✓
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			✓
Perform Disk Check			✓

Action or Menu Option	viewer	operator	admin
View Disk Information		✓	✓
Enable/disable AV Studio feature			✓
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.

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.

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.

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-2 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-2, 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.

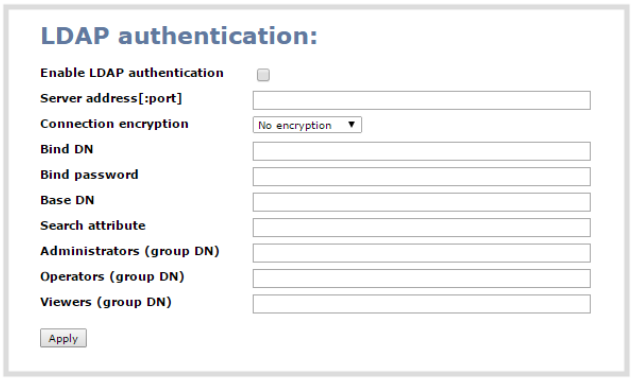
LDAP replaces the local **viewer** account instead of working side-by-side with it when LDAP is enabled and the viewer account has no password (either there is no global viewer password configured or the channel overrides the global password with a blank password). In this case, the viewer must authenticate 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-2.

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-2 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 30 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 31 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 32 *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-2 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-2. 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 33 *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. Up to 6 channels are displayed in the grid view, depending on how many channels you have configured.

The grid view opens by default when you turn on Pearl-2. If necessary, tap the touch screen once to turn it on and tap again to display the controls.

Table 34 *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 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

Item	Description
	• 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.

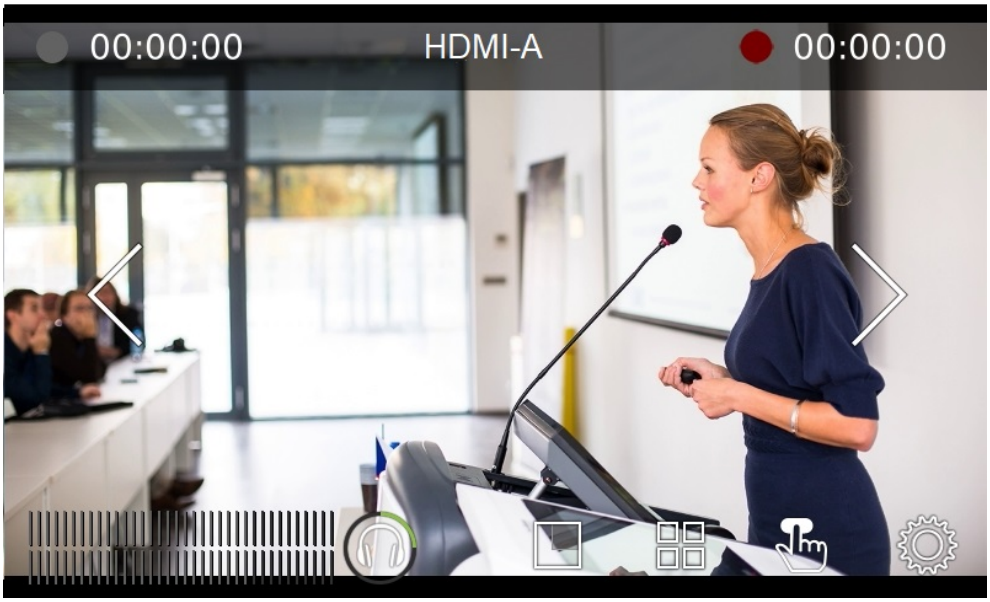


Table 35 *Individual channel view indicators*

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.
Recording status	Recording indicator appears in the top-right corner: (no dot) Recording is disabled. Gray means recording is stopped.

Item	Description
	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

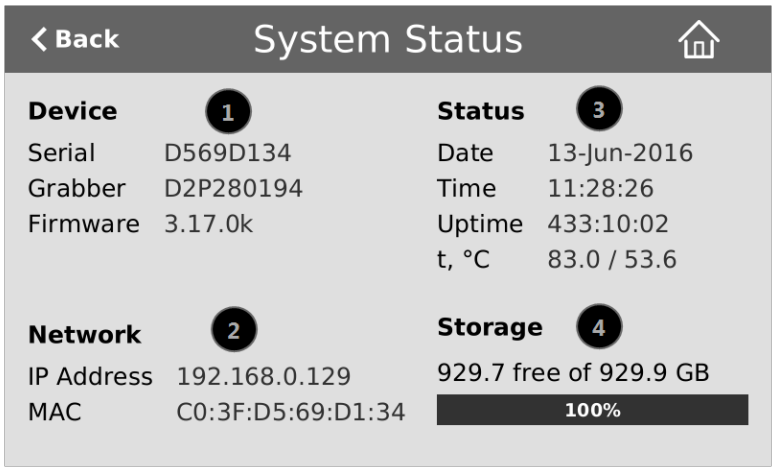
To monitor a different channel, tap the right or left arrows on the channel view to see the next (or previous) channel. If the touch screen controls aren't showing, tap anywhere on the touch screen to make them reappear.

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-2 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-2.

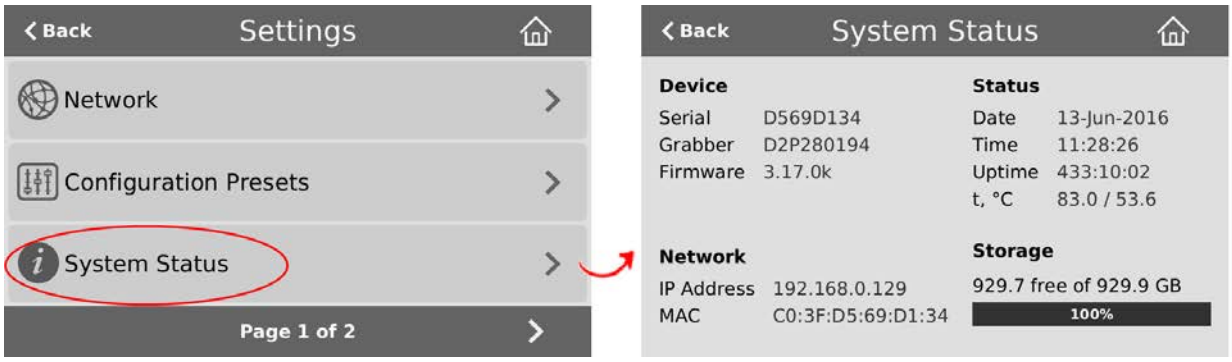


Label	Description
1	Device Information • Serial number • Video grabber number • Firmware version
2	Network Information • IP Address • MAC Address
3	Device Status • System date • System time • Uptime • Temperature in degrees Celsius
4	Storage Information (when available) • Disk space available • Pictogram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

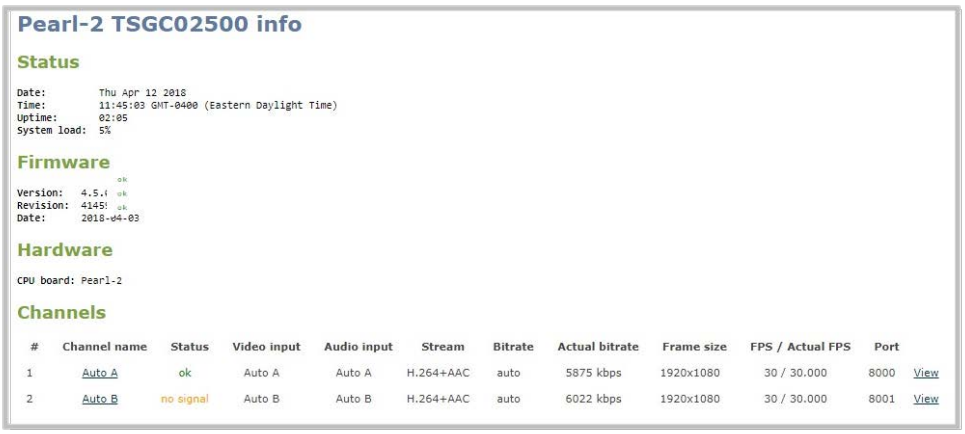
If the system settings control icon won't appear when you tap the touch screen, it may be disabled. See **Configure the touch screen** to enable system information.

View system information using the Admin panel

Get useful information about your Pearl-2 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.



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** or **HDMI 2**). The video output port configuration page opens.

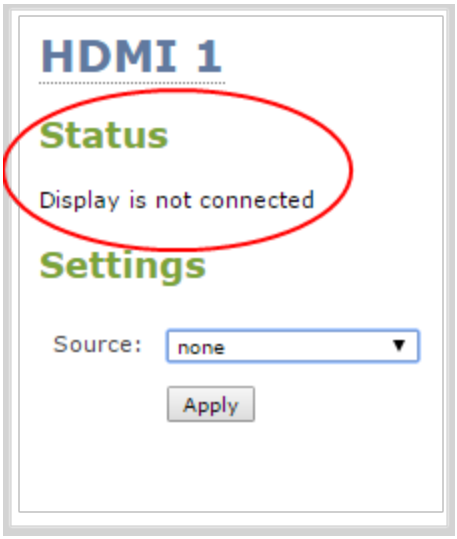


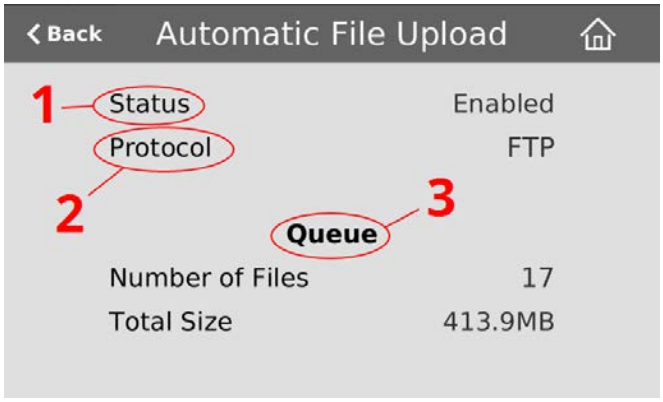
Table 36 *Possible video output status messages*

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-2's touch screen.



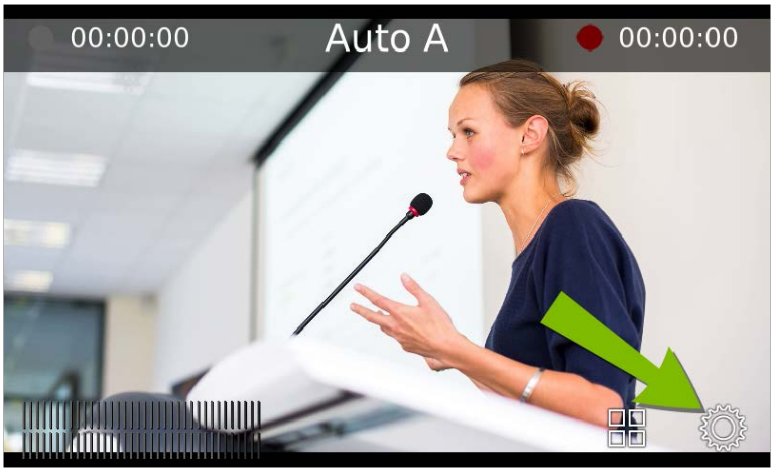
See File and recording transfer to learn how to configure AFU settings using the Admin panel.

Table 37 *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.

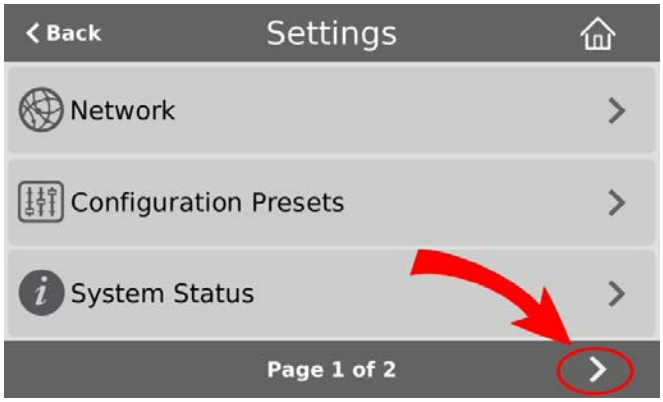
To access the Automatic File Upload status using the touch screen:

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

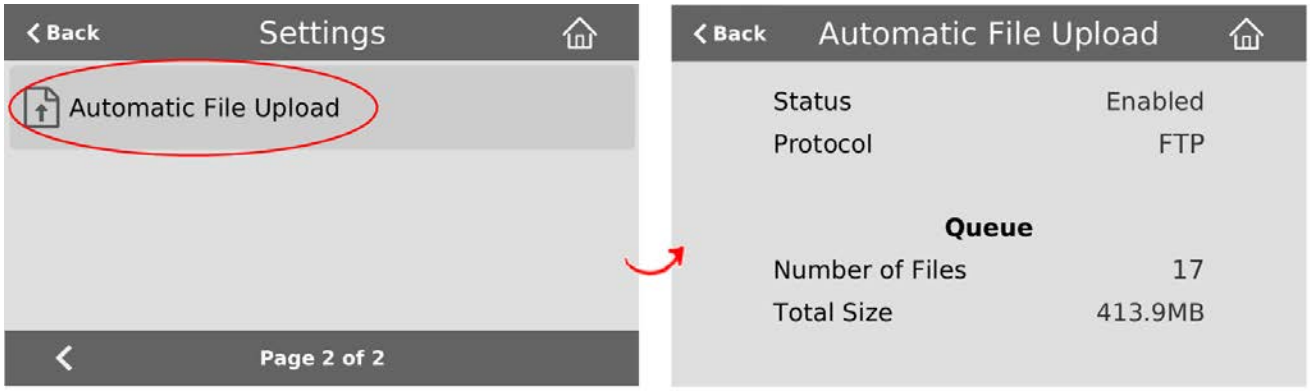


If the gear icon is not visible on the touch screen, tap the screen once to activate the control buttons. If the system settings button is still not visible, it is disabled in the system's touch screen configuration. See **Configure the touch screen** to enable system information.

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
- About automatic channels Auto A and Auto B
- 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-2 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. And you can create multiple channels. For Pearl-2, we recommend a maximum of six 1080p sources in up to 6 full HD channels or having up to four 4K sources[4K] in a single channel for best performance.

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-2. 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. You can even apply chroma key effects to either one or to all your input video sources at the same time.

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

- as the only source in Channel 3 at 1080p, 60 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

When a channel has only one layout and that layout has only one video source, the default channel name is the same as the name of the video source. So for example, a channel with one layout that has HDMI-A in it is named HDMI-A by default.

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.

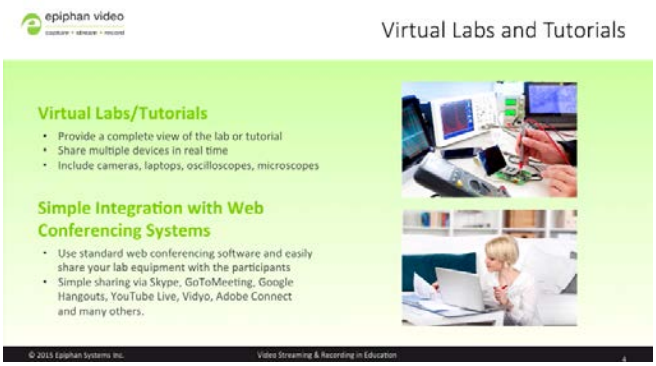
- If the channel is streaming, the stream is stopped and restarted.
- If the channel's recorder is recording, then recording is stopped and a new file is started.

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.

About automatic channels Auto A and Auto B

To get you started as quickly as possible, Pearl-2 comes pre-configured with two channels: Auto A and Auto B.

Simply plug a source into one of the "A" inputs and a second source into one of the "B" inputs. Pearl-2 automatically configures the channel's frame size to match the source resolution and configures a frame rate and bit rate. Audio, if present, is automatically added to the channel.

Default audio setup for the auto channels is always as follows:

Video Source	Audio Source
SDI	SDI Audio
HDMI (DVI)	HDMI Audio (no audio for DVI)
USB video	USB audio

You can start viewing the channel immediately on the touch screen or using an web browser on the same LAN or network as Pearl-2. Browse to the following URL:

For Auto A: http://<serial>.local/preview.cgi?channel=1
For Auto B: http://<serial>.local/preview.cgi?channel=2

For example:http://d560515f.local/preview.cgi?channel=2

If Bonjour services, which permits browsing by serial number, are not installed on your admin computer, you can get the IP address of Pearl-2 from the touch screen display and browse to:

For Auto A: http://<IP Address for Pearl-2>/preview.cgi?channel=1

You find alternate connection streams (i.e. RTSP or MPEG-TS) and can further configure these channels by logging into the Admin panel and accessing Auto A and Auto B using the links under the Channels menu.

You can delete the Auto A and Auto B channels, but they will re-appear upon factory reset or when loading the default configuration profile.

Which signal is used for Auto-A or Auto-B?

Pearl-2 has video input sensing, which means that it knows when a video signal is received from an attached source.

If you attach more than one source to a row while Pearl-2 is powered on, the first source you attach has the highest priority. If you attach more than one source to a row before powering on Pearl-2, the following priority is used:

Priority	Connector Type
1	HDMI (with HDMI Audio)
2	HDMI 4K[4K] (with HDMI Audio)
3	SDI (with SDI Audio)
4	USB video (with USB audio)

The auto channel uses a source until that source no longer has a signal. Then, it switches to the next highest priority signal.

For example, if you attach an SDI source to the "SDI-A" slot and then HDMI into the "HDMI-A" slot, Auto A will show HDMI and use HDMI audio. If the HDMI video signal is lost or you manually select the SDI audio source using the custom layout editor, Auto A will switch to SDI video with SDI audio.

If all the connected sources lose signal at the same time (i.e. for the example above when SDI loses video signal, and no other video signal is found on the HDMI source) no change is made and the auto channel continues to use the current source. In this case, a no signal image is displayed for viewers.

You can see which video and audio sources are configured for the channel from the Info page, see View system information using the Admin panel

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:

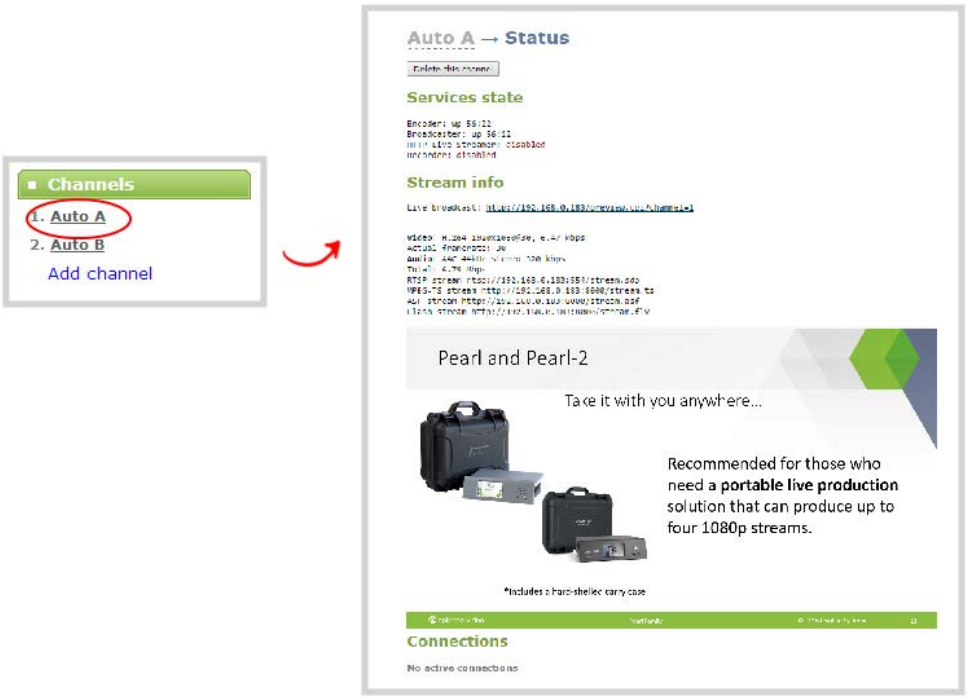
- Configure auto channels
- Create a channel
- Add video sources or a channel as a source
- Add an audio source to a layout
- Duplicate a channel
- Rename a channel
- Delete a channel
- Preview channel
- Add or remove channel metadata
- Configure encoding
- Codecs and file format compatibility
- Configure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

Configure auto channels

Auto channels are included with Pearl-2 to make setup quick and simple. However if you want to set custom encoding or streaming configuration for the channel, you can configure it like any other channel.

To further configure automatic channels Auto A and Auto B:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
3. From the Channels menu, click Auto A or Auto B. The channel's status page opens



4. Configure the automatic channel as you would any other channel.

To change the video source for the two auto channels, just select a different video source using the custom layout editor, see **Add video sources or a channel as a source**. The channel name automatically changes to the name of the selected video source if there's only one source in that channel. For important information about changing the channel name, see **Rename a channel**.

Create a channel

You create channels on Pearl-2 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 encoding**.

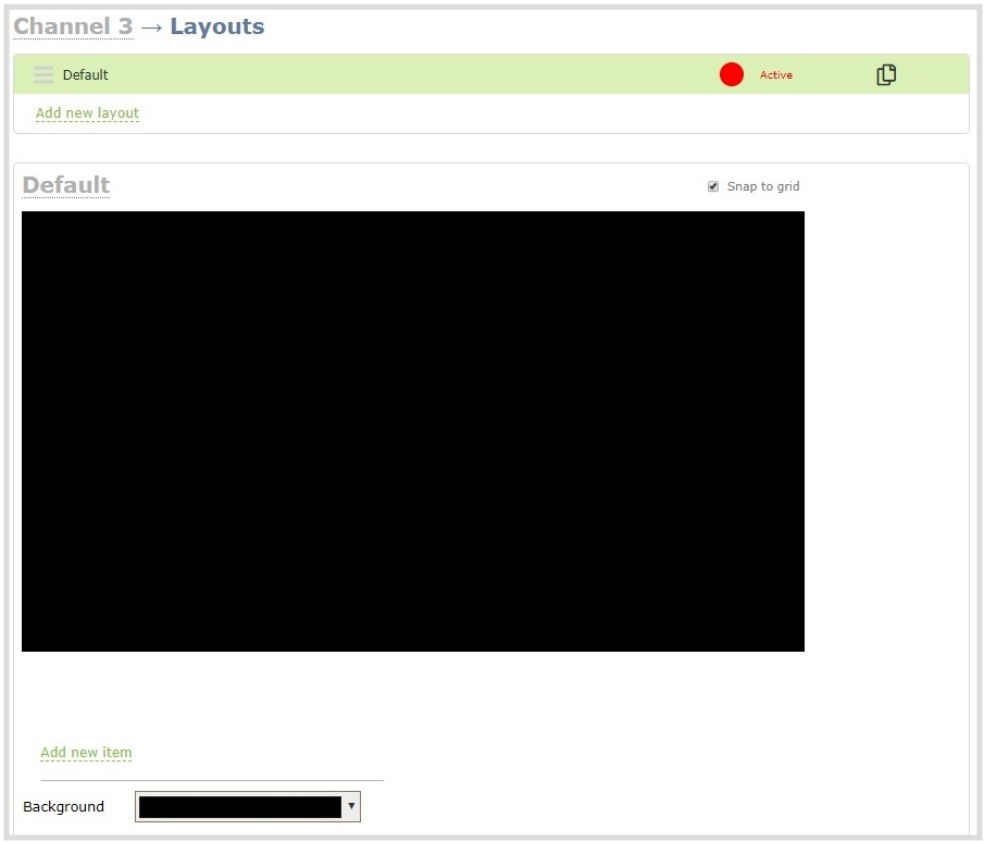
Each additional channel and layout consumes additional CPU processing capacity of Pearl-2, see Optimum CPU performance.

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:

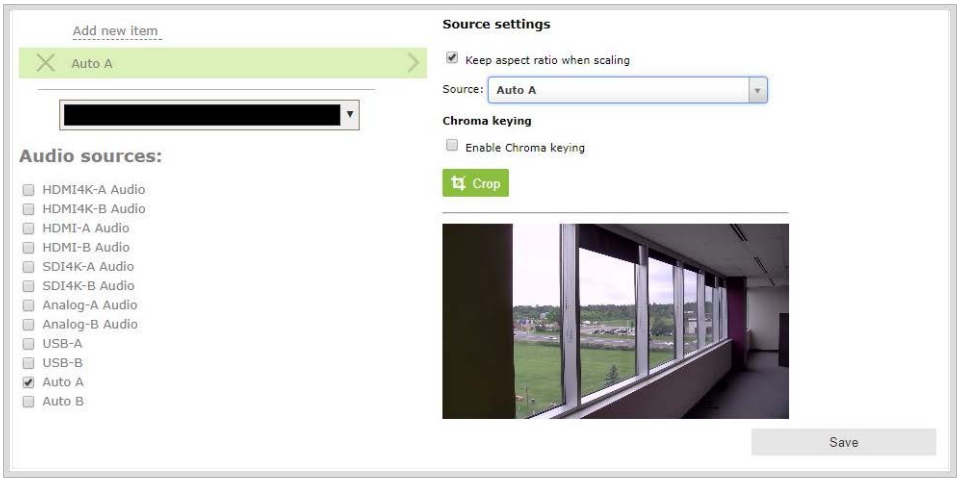
1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the **Channels** menu, click **Add channel**. The custom layout editor for the new channel opens and the default layout is selected.

A 16:9 workspace appears in the layout area.



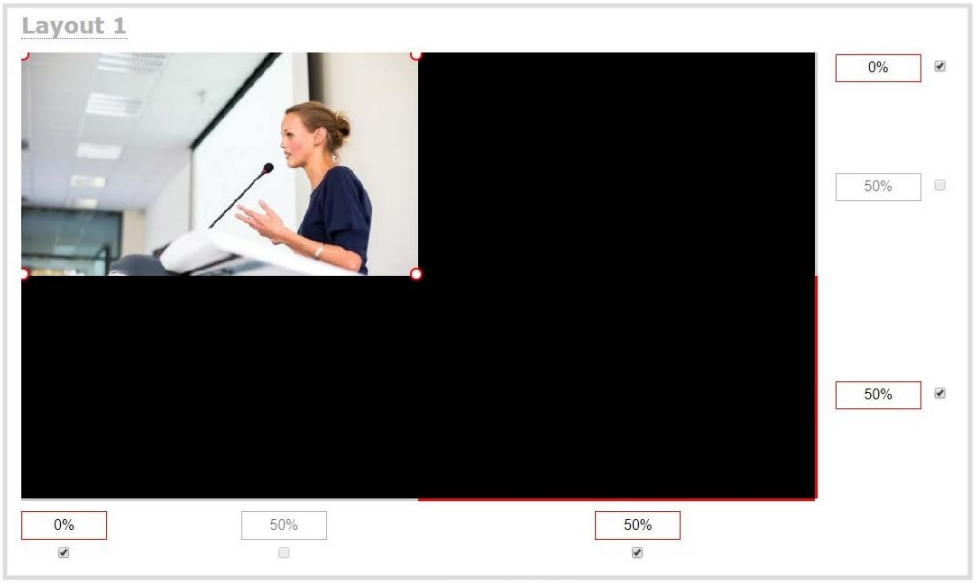
3. Click **Add new item** and select **Video Source**.

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 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 **Channel 1** 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 **Channel 2** 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.

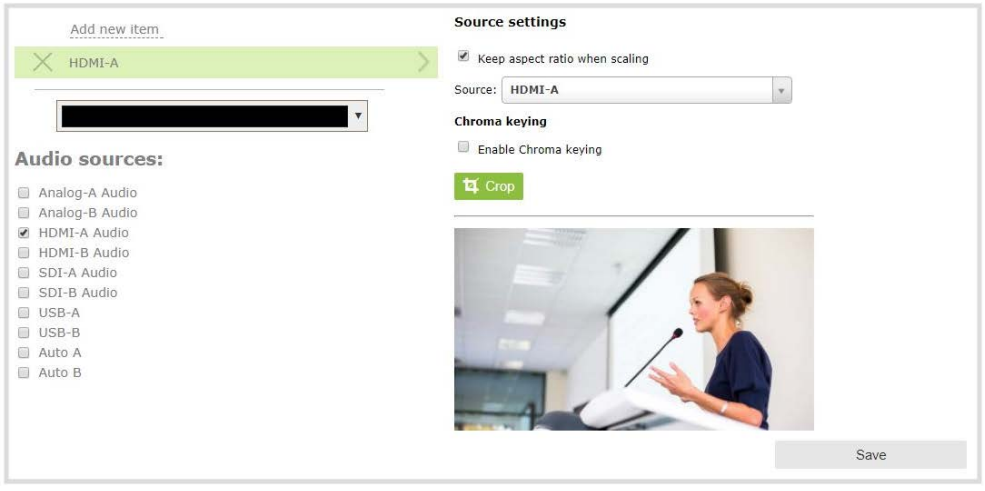
For instructions to set up multi-encoded channels using the channel as a source feature, see Multi-encoding and channel as a source.

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 encoding**.

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

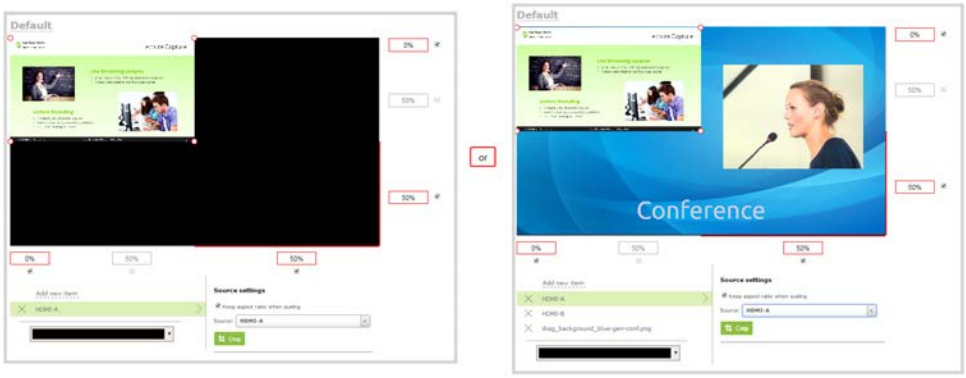
1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Channel menu, select a channel and click **Layouts**. The custom layout editor opens.
3. In the Layouts list that appears at the top of the page, click a layout's row to select that layout or click **Add new layout**.
4. Below the Layout editing 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.

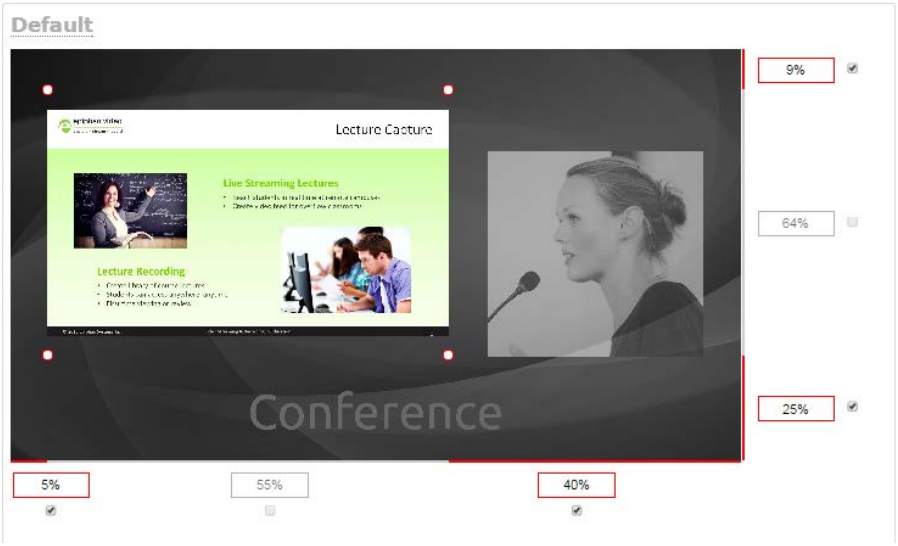


For best results, check **Keep aspect ratio when scaling** in the **Source settings**.

The selected video source appears in the layout editing 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 editing 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.

An 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.

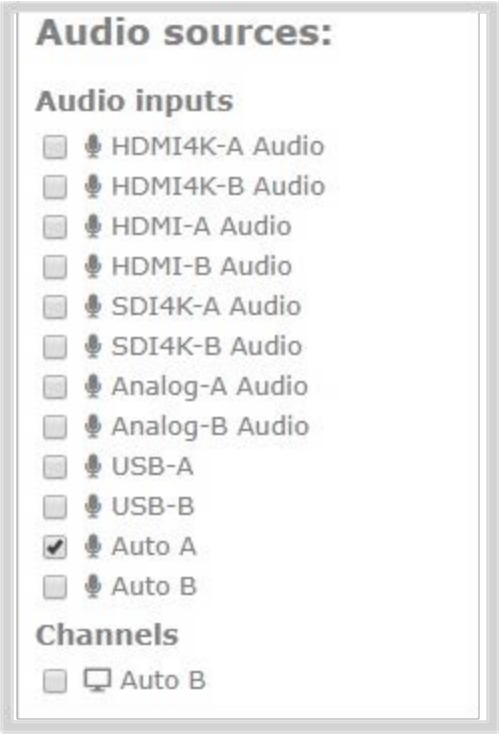
Important considerations

- There is no need to manually add RTSP audio sources to your channel. When an RTSP stream is connected to your Pearl-2 as an input source, a corresponding audio source is automatically added to the list of audio sources for your channels, even if there is no audio in the RTSP stream.
- The right-most XLR audio input and the RCA audio input are linked within Pearl-2. If you use both at the same time, their audio is mixed. If the two audio sources share the same audio signals, the common audio signals are amplified. To avoid this, you can turn disable one or the other audio port, see Assign audio sources to an input.
- 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, then the common audio signals are 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-2, some residual noise may be detected in the layout. Remove the audio source from the layout.

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 encoding.

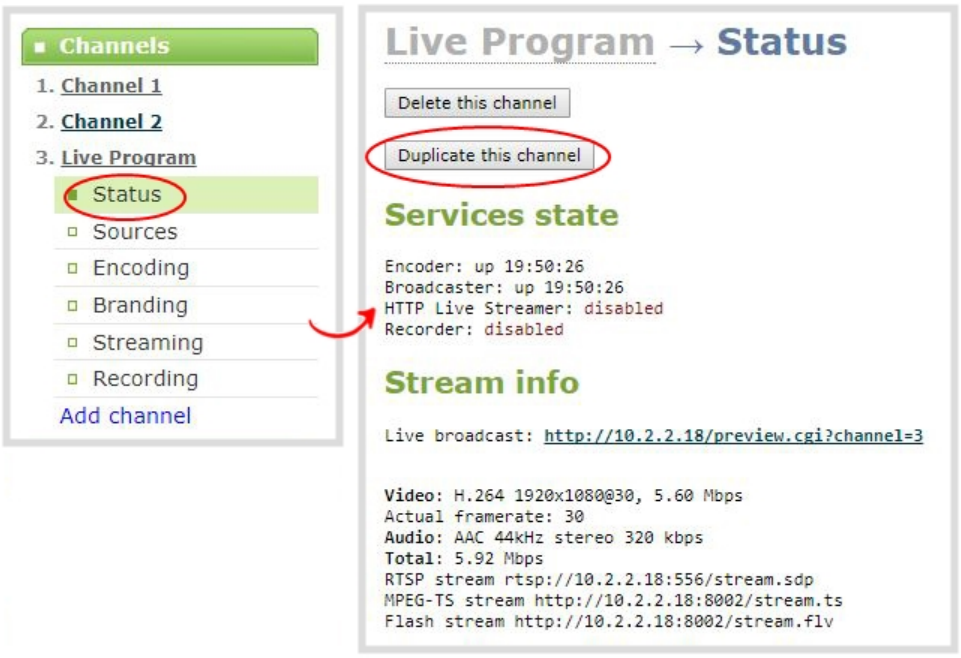
To adjust the gain for an audio input source, see Adjust audio gain and delay.

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.

Auto channels initially have the channel name Auto A and Auto B, but if you change the source to something other than an automatic source, the name of the channel changes to reflect the new source.

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.

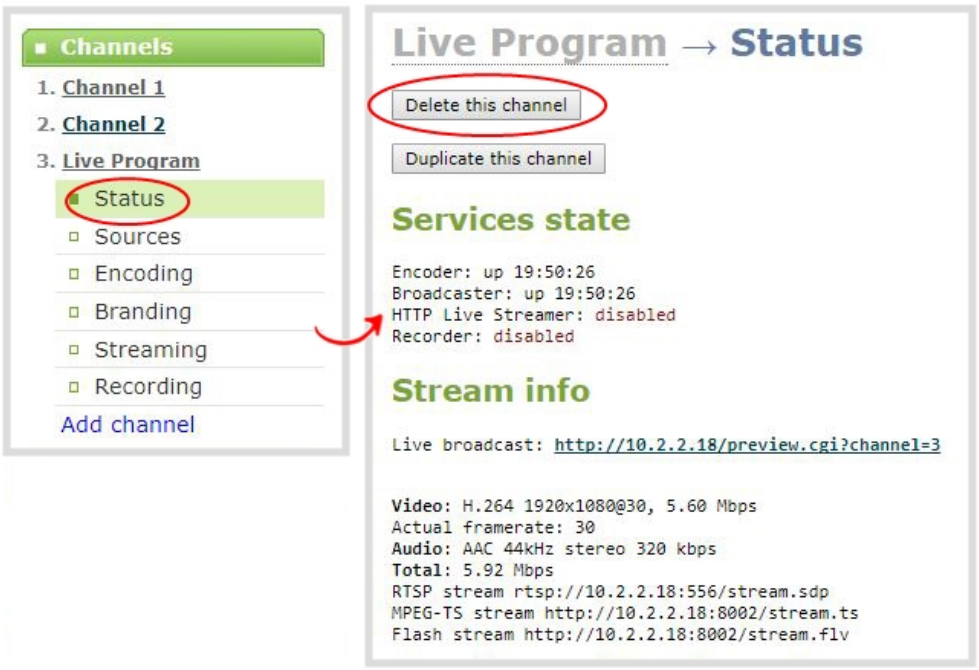
Delete a channel

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-2 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.

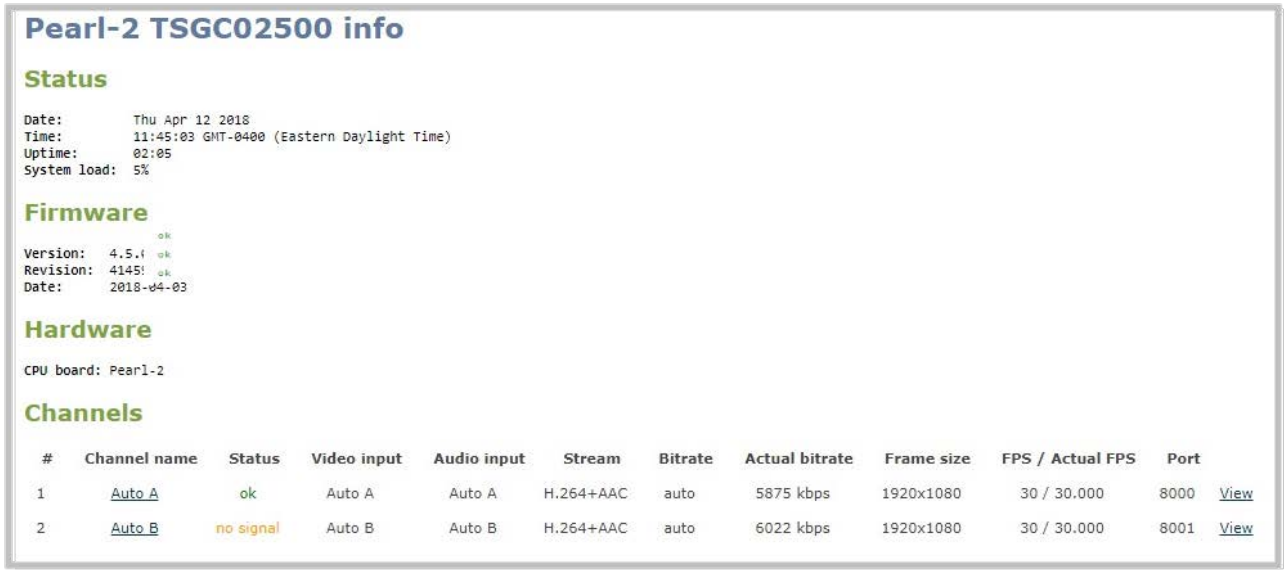
- PCM audio encoding at 48 kHz is not supported. A live broadcast preview link is not provided for a channel that is configured for PCM audio encoding with a sampling bitrate of 48 kHz.

Preview a channel from the Info page

The Info page has preview links for all the channels that are configured on Pearl-2.

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.

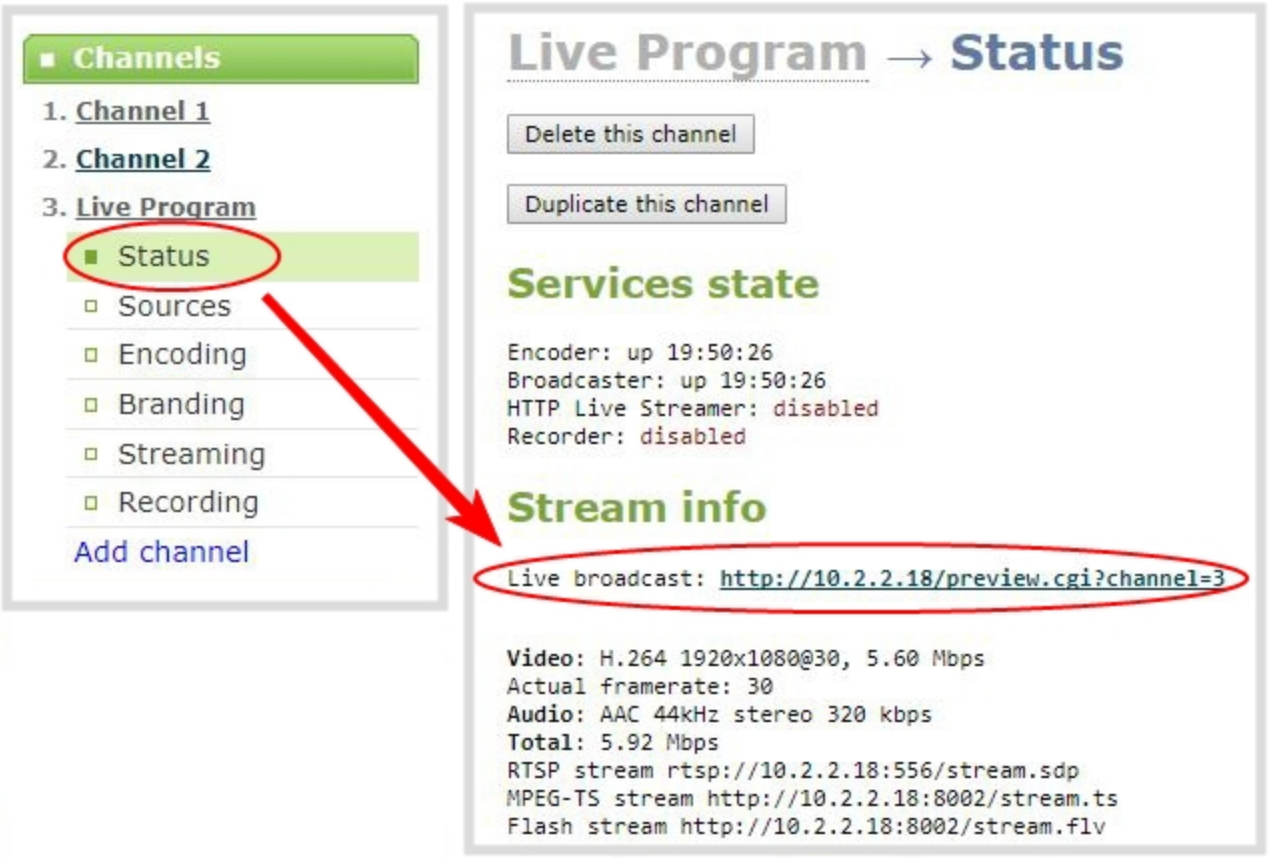
Preview a channel from the Status page

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-2.

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-2 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-2, where *<ip address>* is the IP address of Pearl-2. 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:

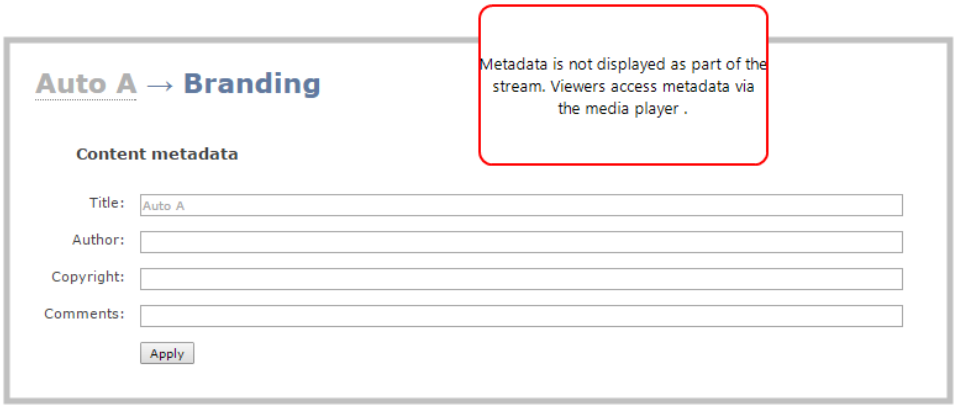
- title of the presentation
- company website
- presenter's name
- copyright date or other labels such as proprietary information, preliminary etc.
- additional information about the broadcast, such as time of the broadcast, or change to the schedule

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 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-2 supports the following video and audio codecs.

Table 38 *Supported video codes*

Value	Description
H.264	H.264 is the default video codec configured for the channels on Pearl-2. 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 39 *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.

Value	Description
MP3	MP3 provides a common audio format for audio storage. Supported sampling 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. The Flash (FLV) plugin must be installed for your web browser to play back audio that's encoded as PCM. Web browsers that use Flash (FLV) do not support 48 kHz PCM 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 40 *Video/audio codecs and formats for streaming*

Video Codec selected	Audio Codec selected	RTSP	FLV	MPEG-TS	MJPEG
H.264	No audio codec	✓	✓	✓	
H.264	PCM	✓	✓		
H.264	MP3	✓	✓	✓	

Video Codec selected	Audio Codec selected	RTSP	FLV	MPEG-TS	MJPEG
H.264	AAC	✓	✓	✓	
MJPEG	No audio codec				✓

The following table displays the compatibility between the video/audio codecs and the supported recording formats.

Table 41 *Video/audio codecs for formats for recording*

Video Codec selected	Audio Codec selected	MP4 and MP4-Fragmented	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-2.
- **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-2 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-2 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-2 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-2 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.

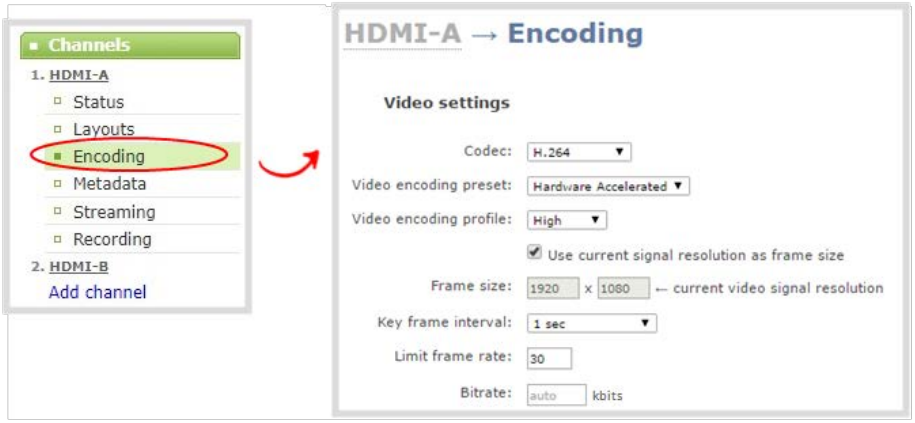
Table 42 Video encoding settings

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.
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

Setting	Description
	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.

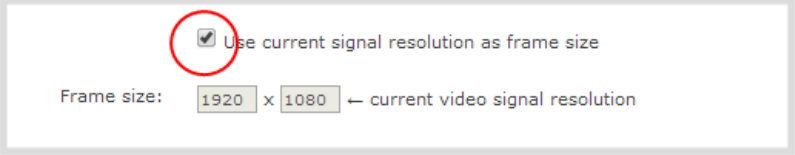


2. Select a video **Codec** and do one of the following:
    a. If **JPEG** is selected, click **Page refresh time** and enter a time in seconds.
    b. If **H.264** is selected, select a **Video encoding preset** and a **Video encoding profile**.

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 profile	**Baseline**: Choose this option when streaming to an application that requires robustness and cannot tolerate data loss, for example video-conferencing.

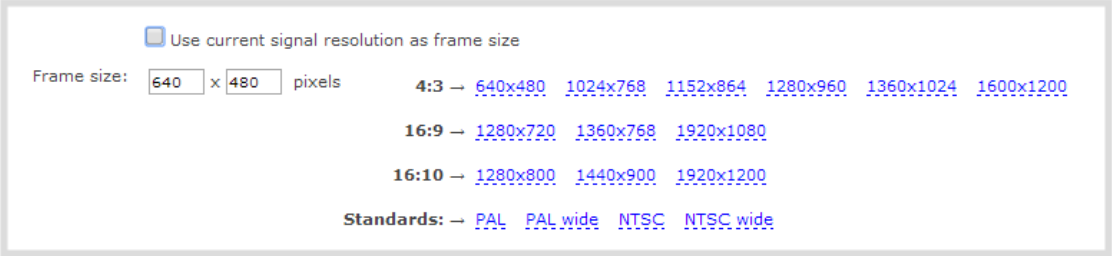
Item	Options
	Main: Choose this option for standard-definition broadcasts. **High**: This is the default. Choose this option when video is viewed for broadcast and disk storage applications, particularly for high definition television application such as Blu-ray disk storage format and HDTV broadcast 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.

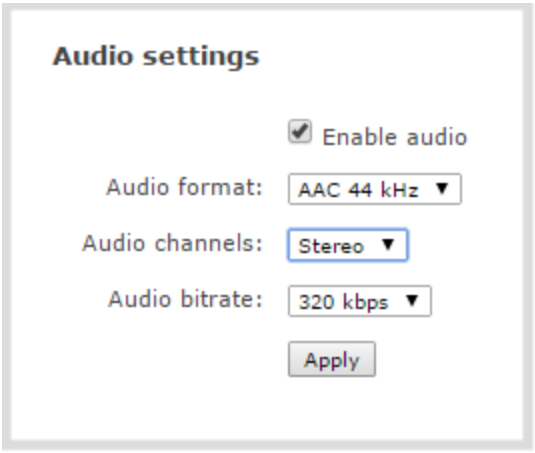
Table 43 *Supported Audio codecs and bitrates*

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. 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.



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.
>
> If you have only one mono analog input, use the left XLR / RCA jack and select mono encoding to have the same sound come from both the left and right channels. (If stereo sound is chosen, the sound will only come through on the left channel.)

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

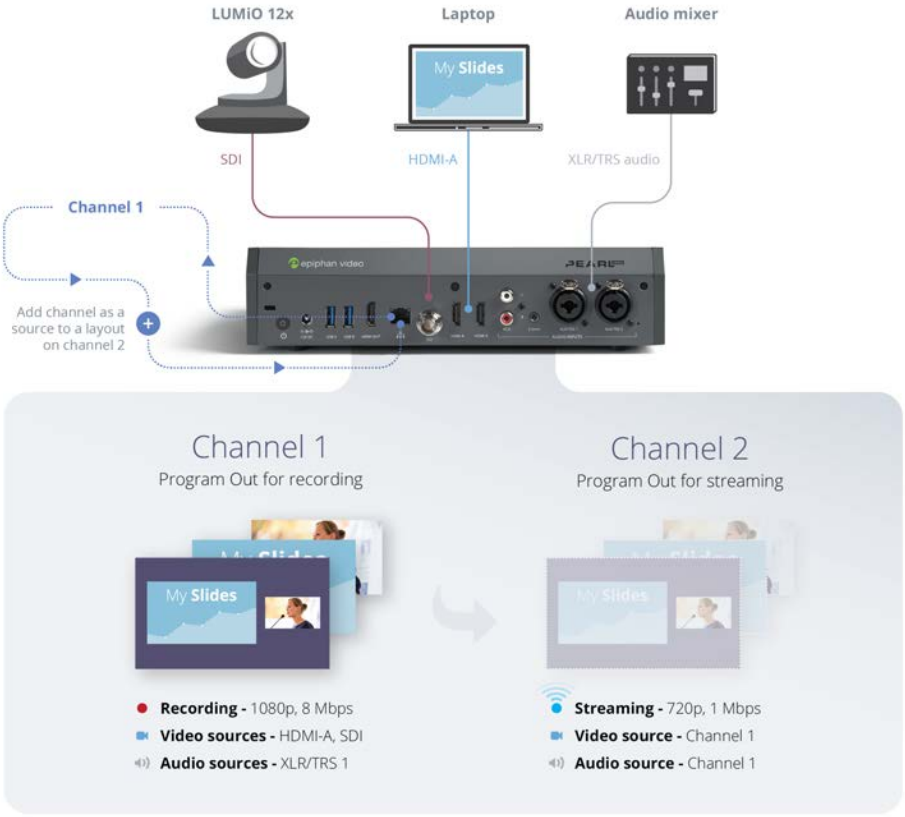
Pearl-2 lets you easily do multi-encoding so you can record and stream the same content at different encoding settings. This is useful when you want to:

- 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 4K and full 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. You can create your custom layouts and do all your switching in one channel (i.e. Channel 1) and then configure Channel 2 to use Channel 1 as a source. That way, both channel's have the identical program. All you need to do now is configure each channel for the encoding settings you want.



Follow these steps:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
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 alternative ways to set up multi-publishing, see 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-2, 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
- Configure chroma keying

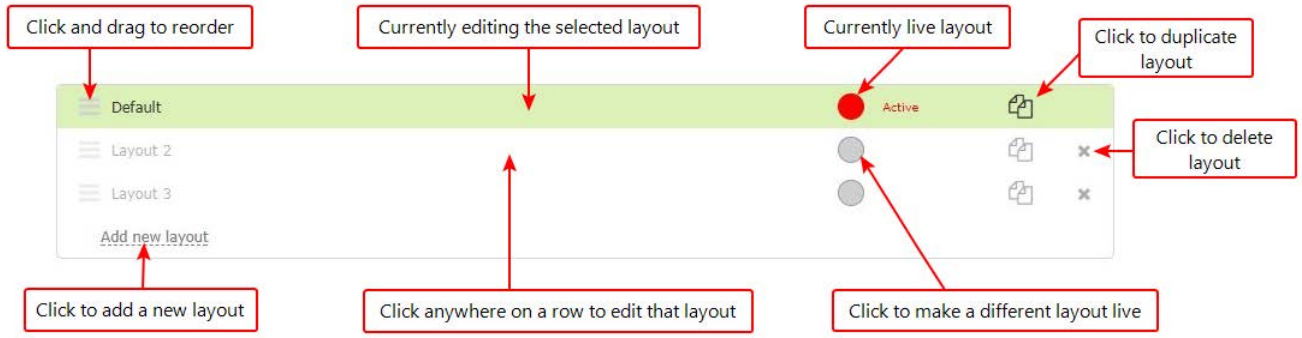
About the custom layout editor

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.

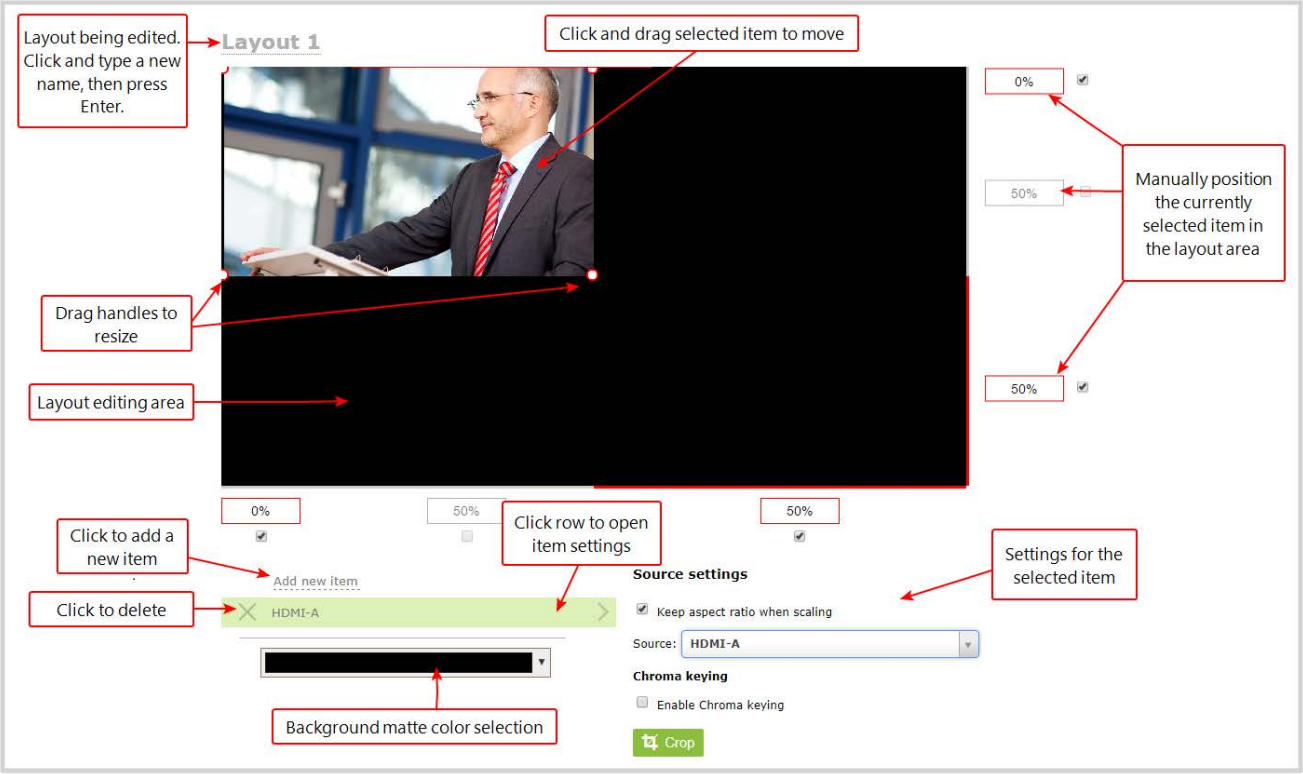
Layout selector

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.

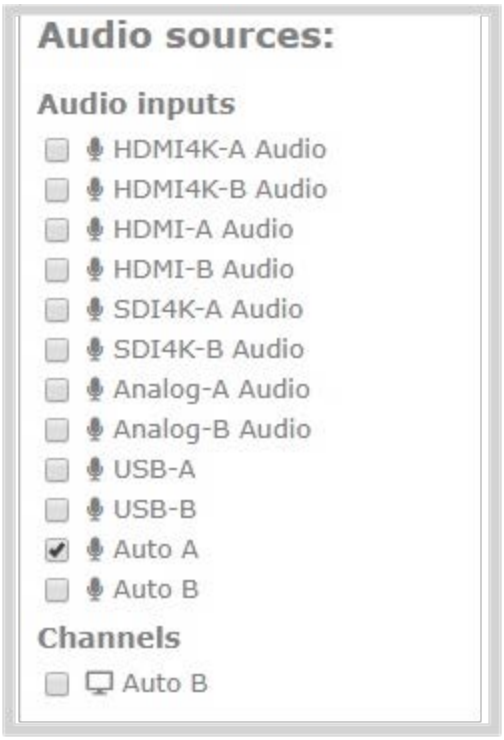
Using pixels:

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.



If an Auto channel is selected as a video source, then Auto A or Auto B audio is selected by default.

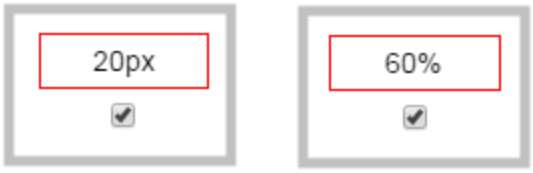
You can have multiple audio sources in a layout. The audio sources are mixed together at the same volume level as one another.

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).

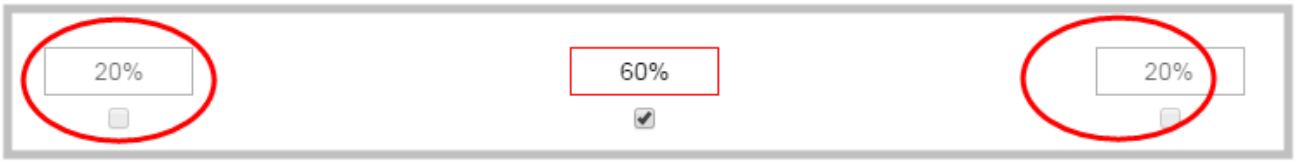


Percent values are used in adjustment boxes by default, and can be converted to pixels by simply overwriting the percent value in a given adjustment box and replacing it with a pixel value.

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 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.

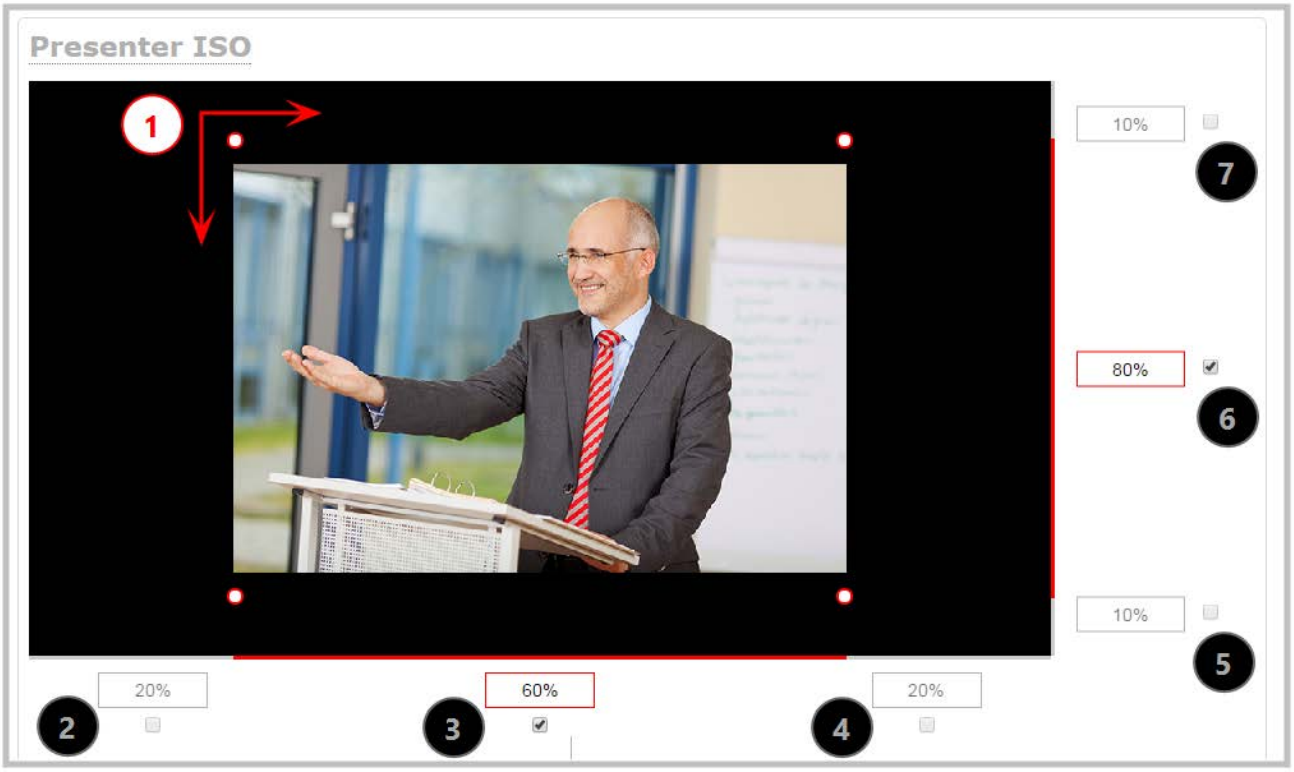


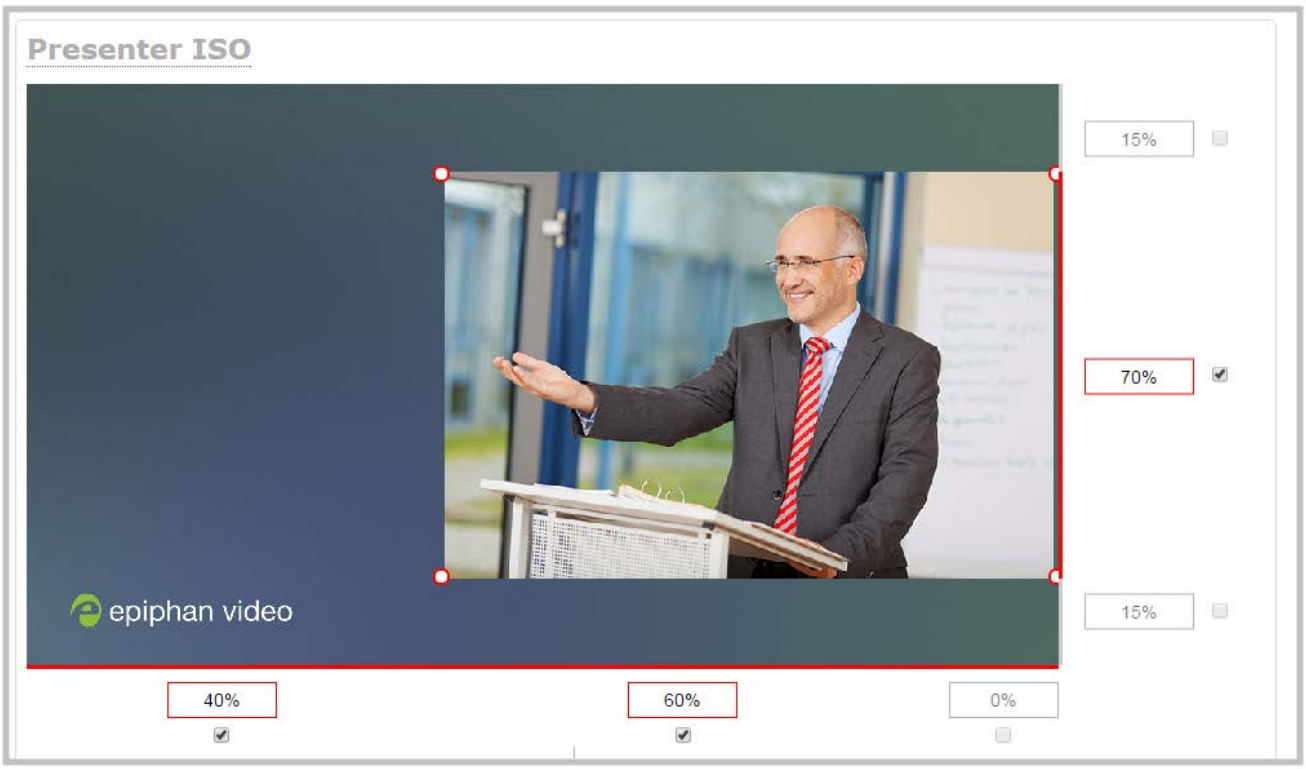
Table 44 *Adjustment boxes for item resizing and positioning*

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 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 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.

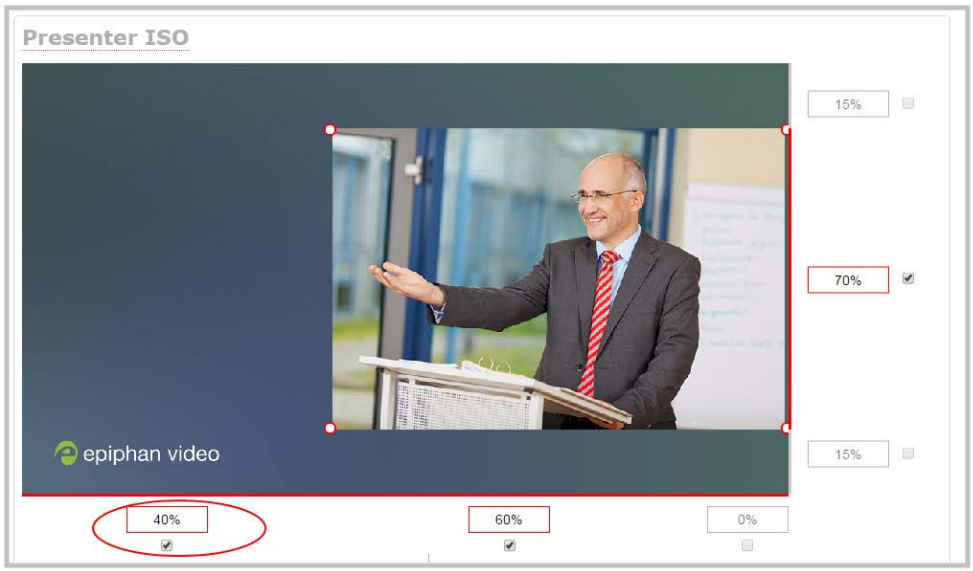
You can also position your item with additional keyboard precision by **holding Ctrl and pressing the arrow keys** to nudge your item by a very small fraction in the direction of your choice.

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).

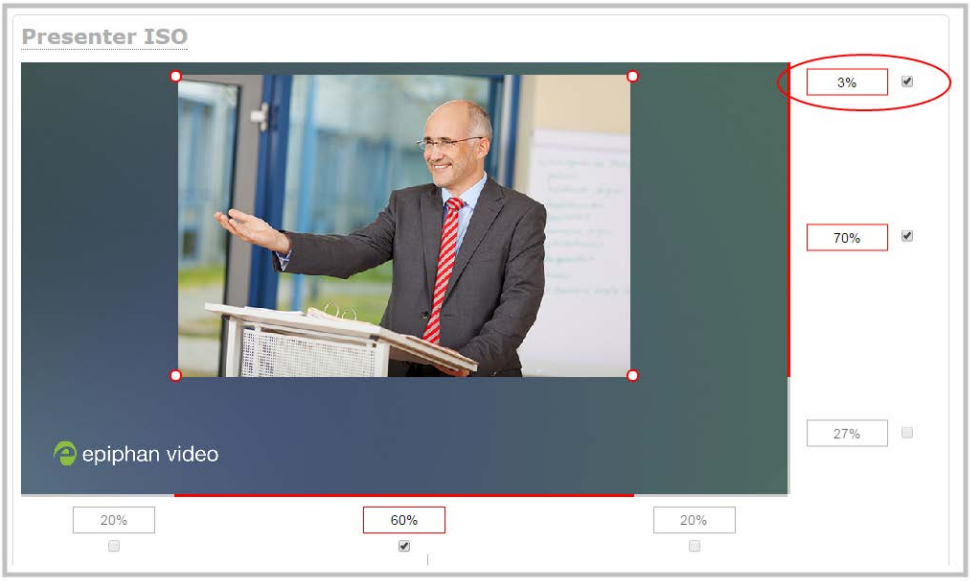


The right adjustment box automatically sets itself to 0% to reflect that there is more no room remaining to maneuver the image along the horizontal axis any further. Alternatively, you could reposition the image in the exact same way by instead setting the right percent box to 0%.

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.

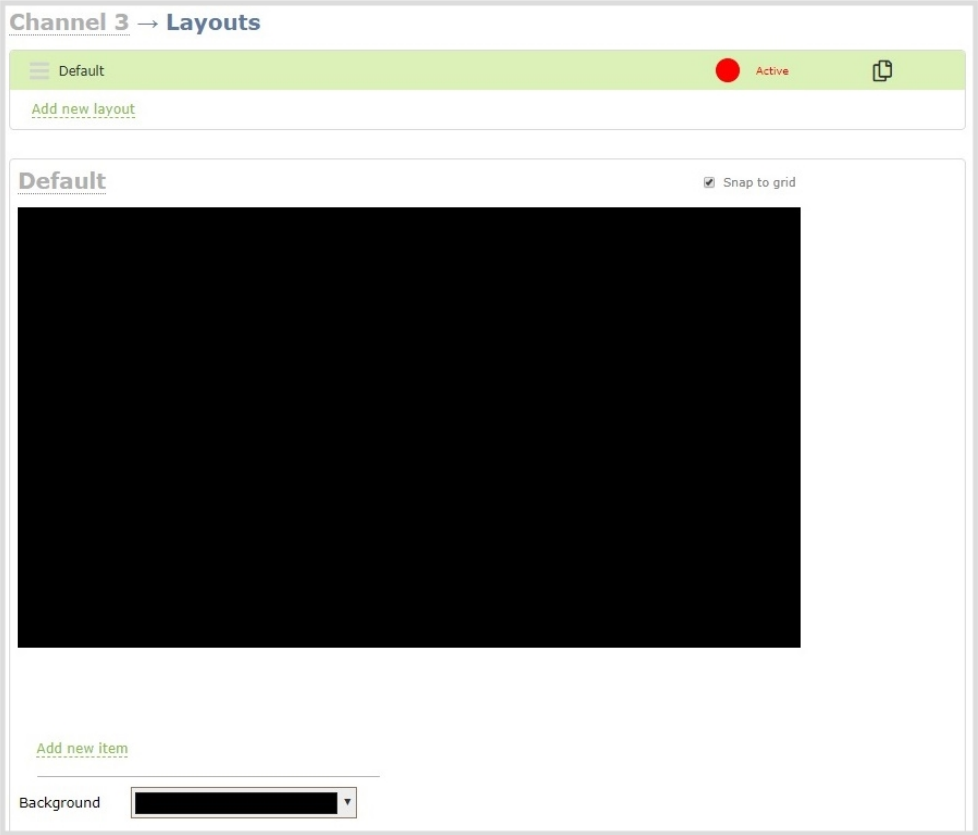
Important considerations:

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.

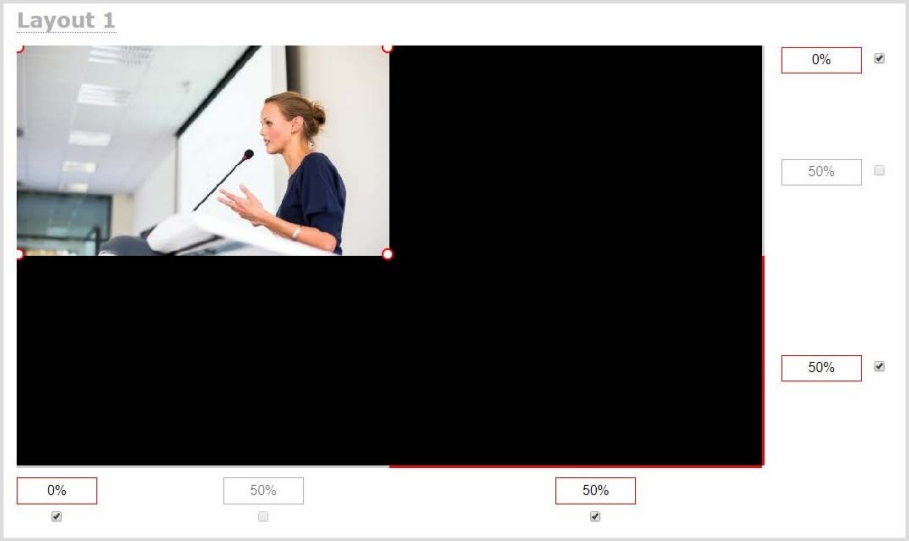
To add or edit a custom layout for a channel:

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

When a channel has only one layout and that layout has only one video source, the default channel name is the same as the name of the video source. So for example, a channel with one layout that has HDMI-A in it is named HDMI-A by default.

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

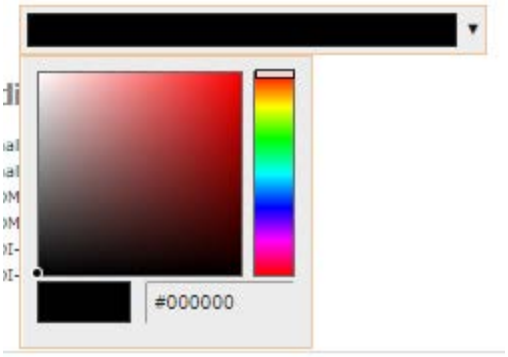
To avoid channel name changes, we recommend that you rename the channel to a custom name. Changing the channel name to a custom name ensures that no automatic channel renaming happens, see **Rename a channel**.

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-2 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.

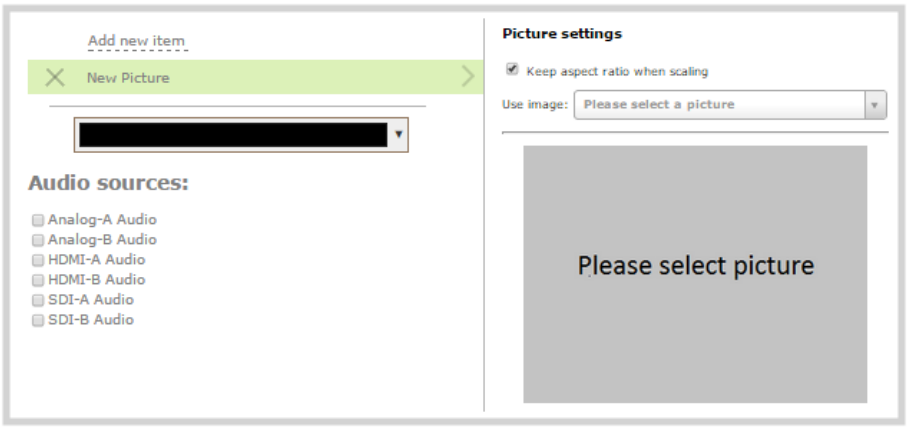
Images can be uploaded in advance from the Media page, see Upload or remove an image using the Media page. Otherwise, you can drag and drop to upload an image using the custom layout editor. Note that no warning is displayed if the image is too large or if an image exists with the same name using drag 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:

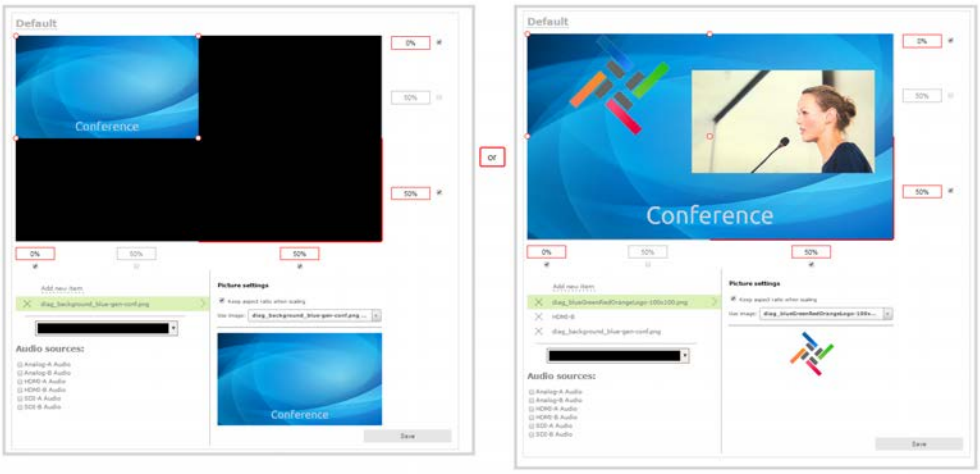
1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Channels menu, select a channel and click **Layouts**. The custom layout editor opens.
3. Click **Add item** and choose **Picture** from the drop down. The picture settings appears.

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).

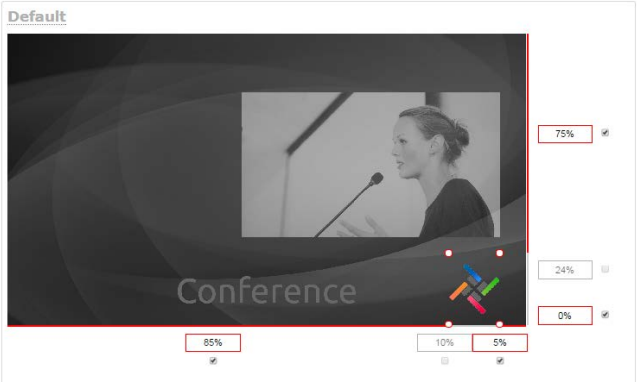


For best results, check **Keep aspect ratio when scaling** in the **Source settings**.

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.

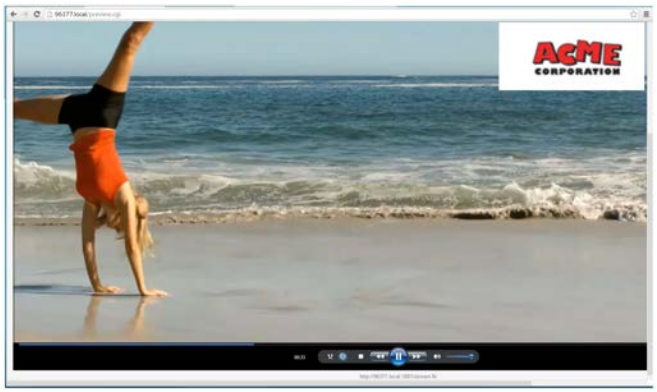
> To layer video sources over top of each other, like for background images or a transparent logo, you can click and drag elements that appear in the item list beneath **Add new item** and change their order. Items that are higher up the list appear over top items that are lower down the list.

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).

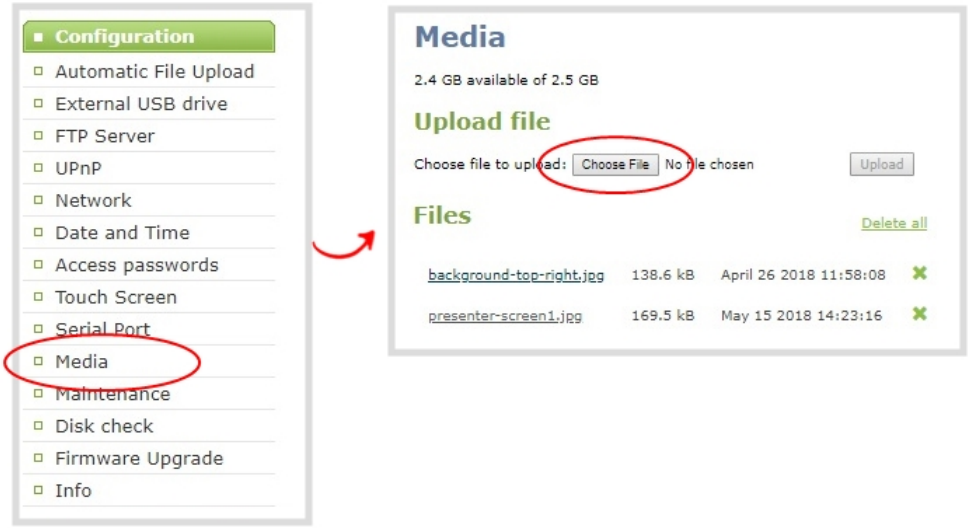
There are two ways to upload images. You can upload images using the Media page or drag and drop your image in to a layout using the custom layout editor, see Add an image to a layout. Uploading an image of the same name overwrites the existing image.

Important considerations

- Media file names should not include special characters, slashes, or spaces.

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 45 *Overlay text shortcut codes*

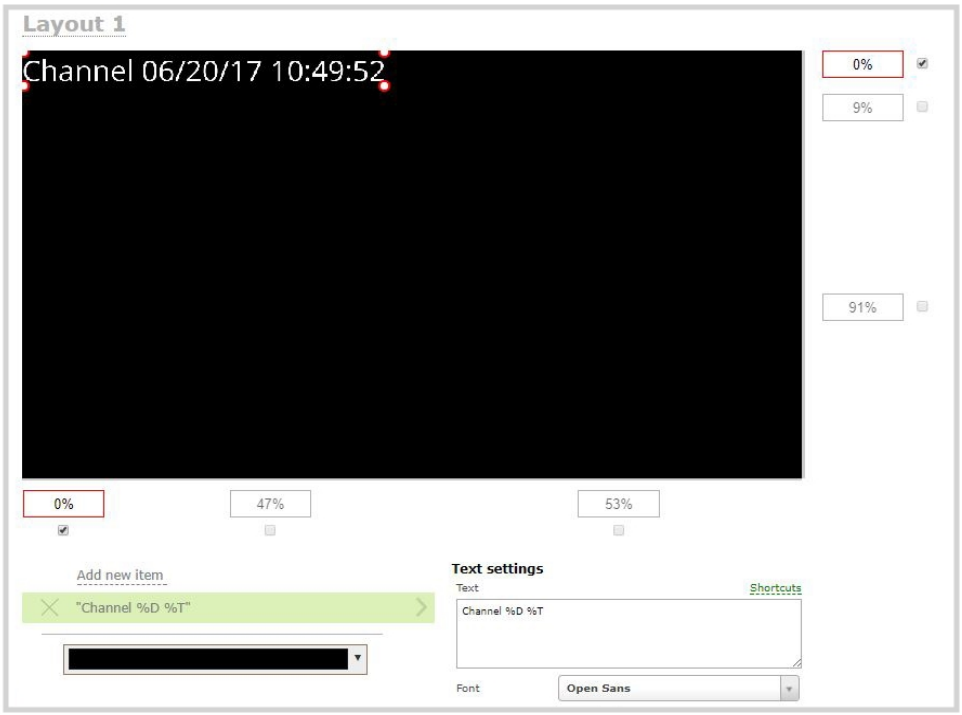
Item	Shortcut code	Example
date	%F	2012-01-26
year	%G	2012
month (01)	%m	01
month (Jan)	%b	Jan
month (January)	%B	January
day of the month	%d	26
weekday (Thu)	%a	Thu
weekday (Thursday)	%A	Thursday
time	%T	08:40:45
hour	%k	08
minute	%M	40
second	%S	45
millisecond	%#m	378
channel name	%c	Camera Feed 1

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 editing 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 editing 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.

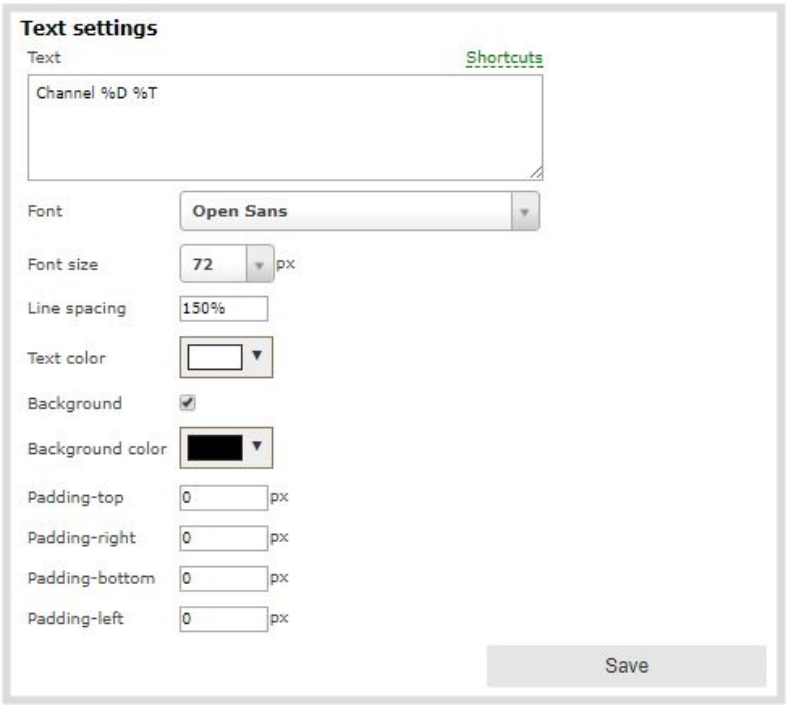
   For example, if you enter:

```
%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.



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 editing 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.

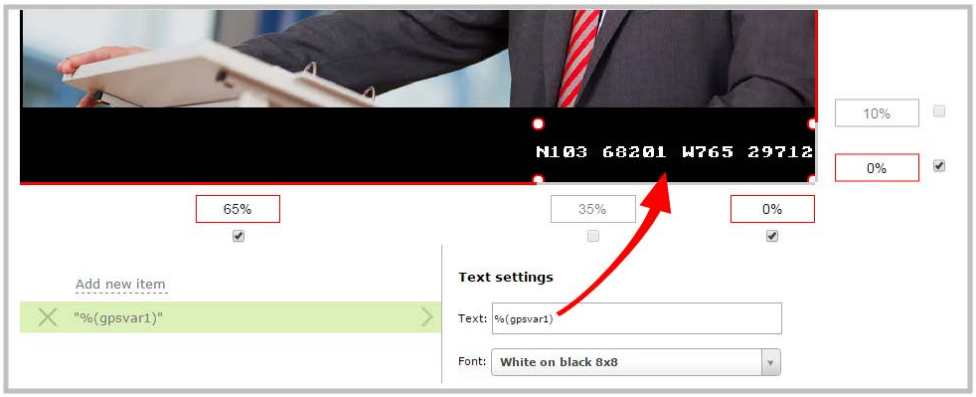
8. Click **Save**.

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-2 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.

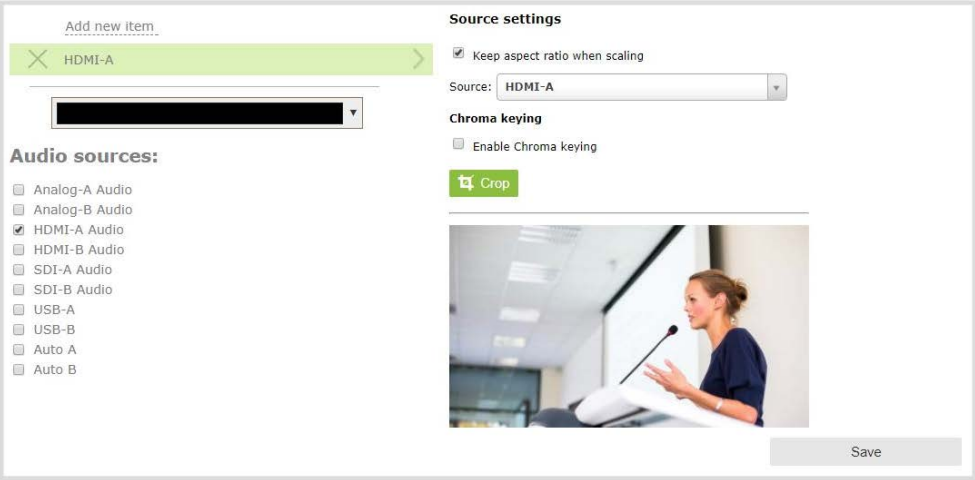
Crop a video source

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-2. You can capture a 1080p section from a 4K source, a

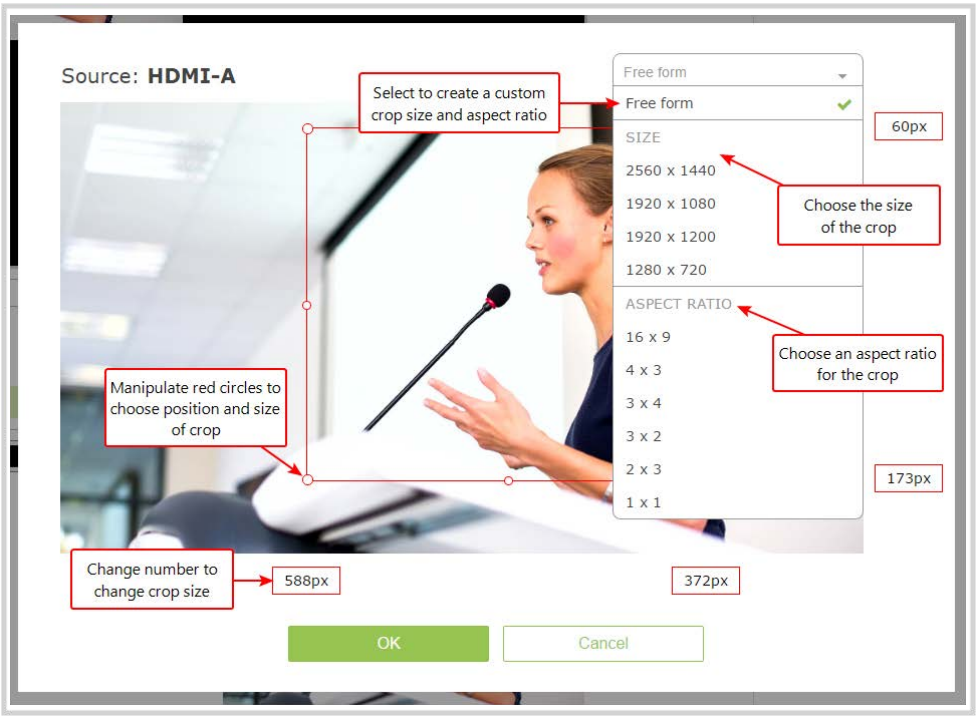
specific aspect ratio or size from a source, or select a crop that fits into your layout better than the full area of your video.

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.

Configure chroma keying

Pearl-2 supports chroma keying so you can add special effects to any video source in a custom channel. Add great looking effects such as animated lower thirds using a titler software or add a custom background using green screen. It's easy to get creative.

With chroma keying, you can choose a specific color in your video scene and replace everything of that color with a different image or video.

The most common color used for chroma keying is green. In this example, the original video source shows someone standing in front of a green screen. Using chroma key in Pearl-2, an image of an office space replaces the green background.

White, grey, and black are not recommended colors for chroma keying. Those are treated as the same color with a different luminance value. The result in Pearl-2 is that the chroma keying affect gets applied to all shades ranging from white to black.

You configure chroma keying using the custom layout editor, see About the custom layout editor.

Topics include:

- Performance considerations
- What is upstream chroma keying?
- What is downstream chroma keying?
- Set up chroma key for a green screen video source
- Add external titler software effects to Pearl-2
- Add chroma key titler effects using Microsoft Powerpoint slides

Performance considerations

Chroma keying can impact the performance of Pearl-2 depending on factors such as how many chroma key sources you add, if you scale the chroma key video source using the custom layout editor, and your frame rate.

For best performance, avoid excessive scaling of video sources that have chroma keying enabled. Cropping video sources that have chroma keying enabled helps reduce processing and optimizes the performance of Pearl-2.

You can monitor the performance of Pearl-2 from the **Info** tab using the Admin panel for the custom channel that has chroma keying enabled. For more information about performance monitoring, see What is Pearl-2?.

Observe the following:

- For Pearl-2, the maximum resolution is 1920×1080 at 30 fps for chroma keying.
- Avoid scaling a video source that has chroma key enabled.
- Where possible, crop the video source that has the chroma key enabled to minimize the area that Pearl-2 must process for the chroma key effect.
- Overloading the Pearl-2 processor can cause frame drops.

What is upstream chroma keying?

Upstream chroma keying applies the chroma key effect to a specific video source before it's processed, switched, and broadcast.

For example, you could display the name of a guest using titler software on only the camera that is dedicated for close ups of that person but not on any of your other video sources.

To get an upstream key effect using Pearl-2, you can create custom layouts for each video source using the custom layout editor. Then set up chroma keying on just one custom layout. Only the video source that appears in the custom layout with chroma key enabled has the chroma key effect applied to it.

If you want to apply the chroma key effect to a video source that appears in several different custom layouts, you must enable the chroma key effect in each custom layout where that particular video source appears.

What is downstream chroma keying?

Downstream chroma keying applies the chroma key effect to all video sources you broadcast after they're processed and switched.

A common use of downstream keying is to display a persistent image, like a company logo, so that it always appears on screen.

To get a downstream key effect using Pearl-2, you can enable the same chroma key effect on all your custom layouts. This way, the same chroma key effect gets applied to everything you stream or record.

Set up chroma key for a green screen video source

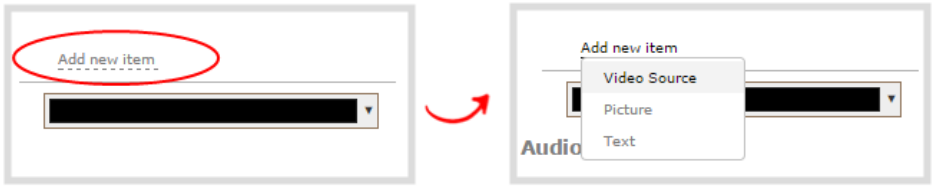
A common use of chroma keying is to use a green screen and then replace the green background with another video or still image.

Your chroma key source can come from a video camera or an effects computer connected to Pearl-2. The background you use can be from another video source, a still image that you've uploaded to Pearl-2, or from an effects computer.

This example shows two camera sources connected to Pearl-2. The green screen appears in the video source connected to HDMI-A and the office background is from HDMI-B.

To configure chroma keying for a green screen video source:

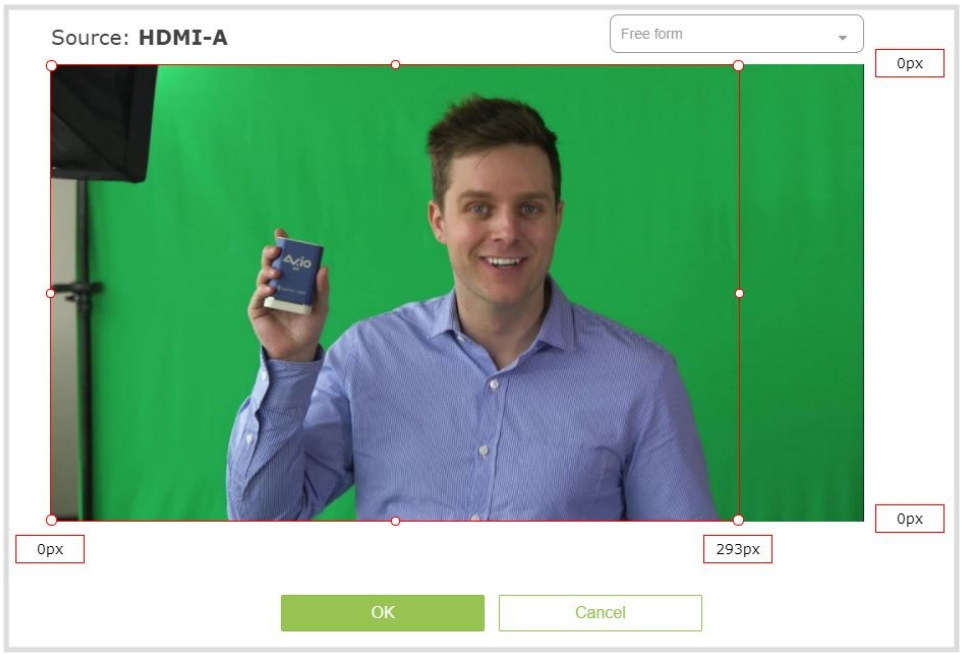
1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. Follow the steps in Add or edit a custom layout to create a custom channel.
3. From the custom layout editor, click **Add new item** and select **Video Source**.



4. Click **Source** and select the video source that you want showing through the background of your chroma key colored areas. For detailed steps, see Add video sources or a channel as a source.
5. In the layout editing area, click and drag to position the video. See the note after this procedure for positioning techniques.

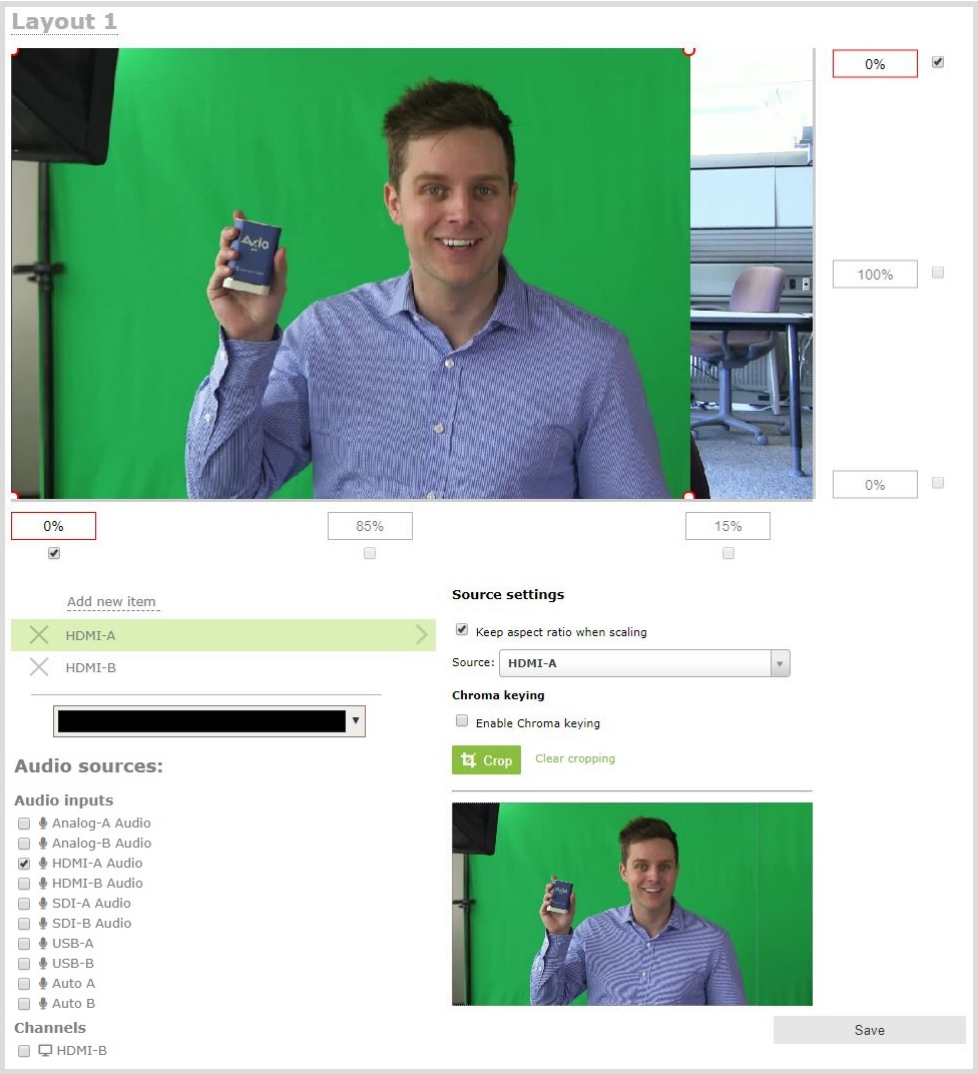
For best results, select the **Keep aspect ratio when scaling** checkbox from the **Source settings** box.

6. Click **Add new Item** again and add the video source that has the green screen image.
7. Click the **Crop** button and crop your green screen video source in the pop-up crop editing window. For detailed steps, see Crop a video source. Click **OK** when your done to return to the custom layout editor.

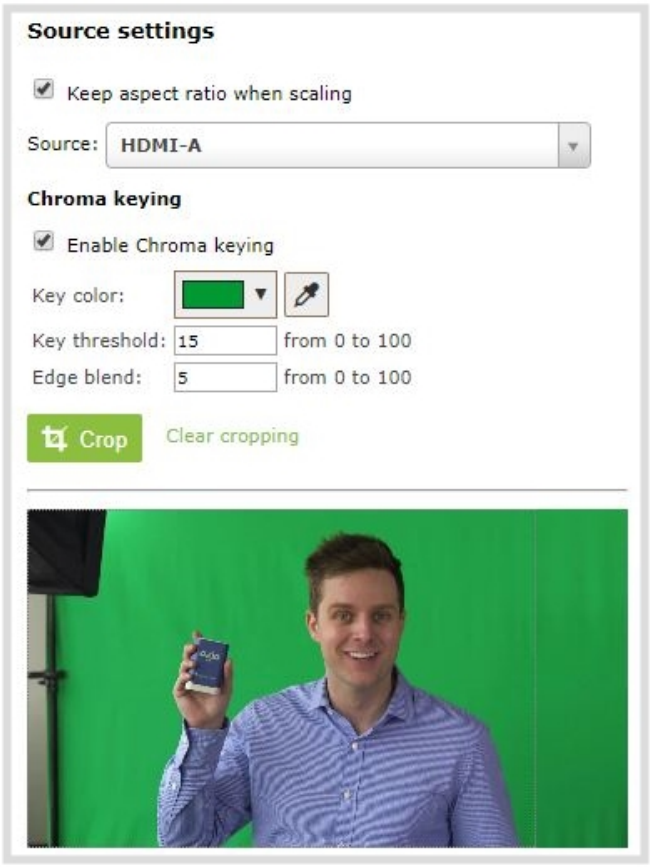


Cropping the green screen video source helps optimize the performance of Pearl-2.

8. In the layout area, position the green screen video source over top the other video source. To optimize performance, avoid scaling the green screen video source if you can.



9. With the green screen video source selected, check **Enable Chroma keying** in the custom layout editor. The chroma keying options appear.



White, grey, and black are not recommended colors for chroma keying. Pearl-2 treats them as the same color with different luminance values. As such, chroma keying affects all shades ranging from white to black.

10. Click the eye dropper and then click on a color in the thumbnail image to choose the chroma key color.

The background video image shows through all the colored areas on the chroma key video layer that match the color you select as the chroma key.

11. Adjust the chroma color selection and blend the edges to remove unwanted chroma effects or residual color.
    a. Enter a number in the **Key threshold** field to adjust the color selection. A value of 0 equals the original color you selected. A higher value widens the range of the selected chroma color. A lower number narrows the range of the selected chroma color.
    b. Enter a number in the **Edge blend** field to smooth out and adjust the color around the edges in your image.

12. Click **Save** when you're done.

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 chroma key titler effects using Microsoft Powerpoint slides

You can use the chroma key feature on Pearl-2 with Microsoft Powerpoint slides to add animated titles and other Powerpoint effects. The setup is really the same as using a dedicated titling software on an effects computer with Pearl-2.

This example shows an HDMI camera connected to the HDMI-A port on Pearl-2 and an effects computer that has a Powerpoint presentation loaded on it connected to the HDMI-B port. To the computer, Pearl-2 is treated just like an external display.

You can connect the effects computer with the Powerpoint file to any supported port that is available on Pearl-2.

To apply the chroma key effect to a single video source using Pearl-2:

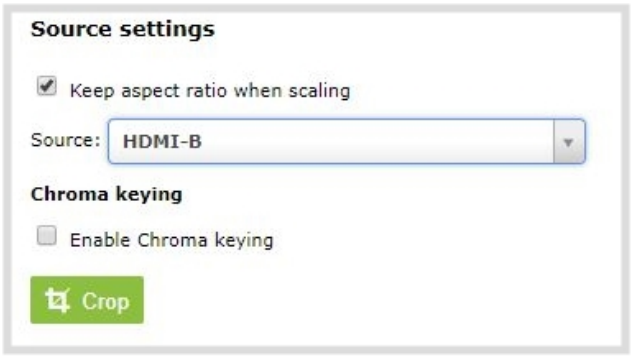
1. Login to the Admin panel as **admin**, see Connect to the Admin panel.

2. Follow the steps in Add or edit a custom layout to create a custom channel.
3. From the custom layout editor, click **Add new item** and select **Video Source** from the drop down box.

4. Click **Source** and select the video source that you want showing in the background. For detailed steps, see Add video sources or a channel as a source.
5. In the layout editing area, click and drag to position the video. See the note after this procedure for positioning techniques.

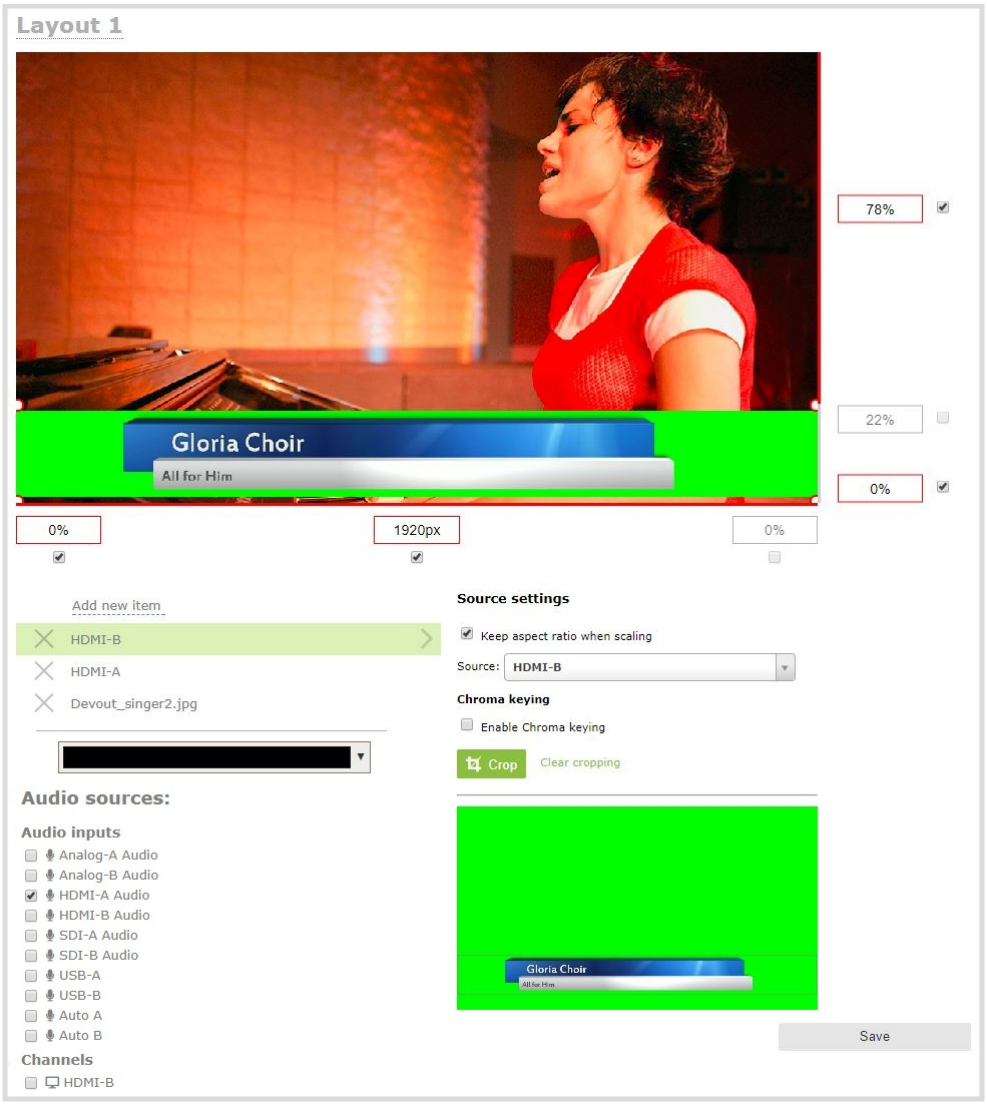
For best results, select the **Keep aspect ratio when scaling** checkbox from the **Source settings** box.

6. Click **Add new Item** again and add the video source from your effects computer.
7. Click the **Crop** button and crop your Powerpoint video source in the pop-up crop editing window. For detailed steps, see Crop a video source. Click **OK** when your done to return to the custom layout editor.

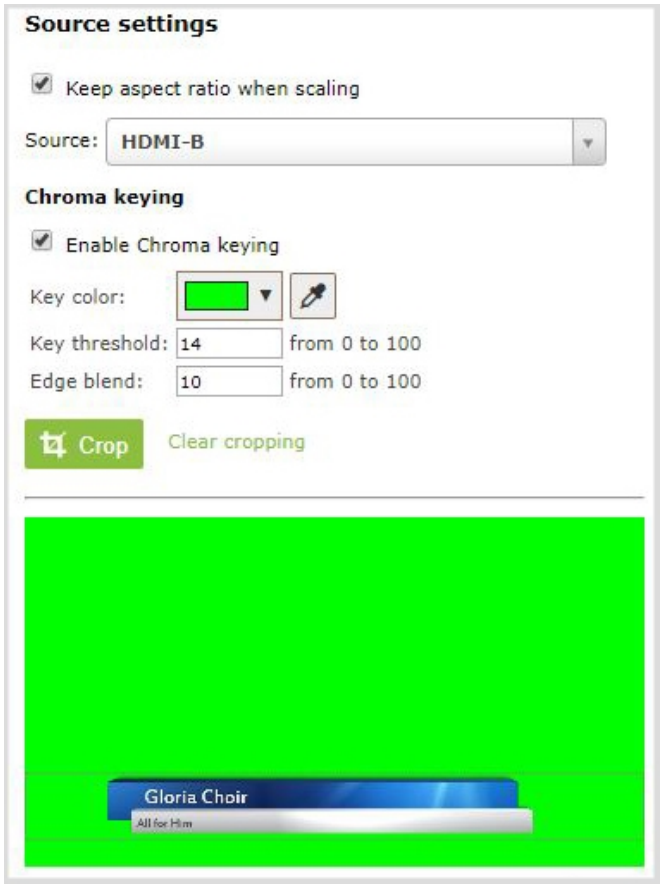


Cropping the Powerpoint computer video source helps optimize the performance of Pearl-2.

8. In the layout area, position the Powerpoint video source over top the other video source. To optimize performance, avoid scaling the Powerpoint video source if you can.



9. With the Powerpoint video source selected, check **Enable Chroma keying** in the custom layout editor. The chroma keying options appear.



10. Click the eye dropper and then click on a color in the thumbnail image to choose the chroma key color.

> The background video image shows through all the colored areas on the chroma key video layer that match the color you select as the chroma key.

11. Adjust the chroma color selection and blend the edges to remove unwanted chroma effects or residual color.
    a. Enter a number in the **Key threshold** field to adjust the color selection. A value of 0 equals the original color you selected. A higher value widens the range of the selected chroma color. A lower number narrows the range of the selected chroma color.
    b. Enter a number in the **Edge blend** field to smooth out and adjust the color around the edges in your image.
12. Click **Save** when you're done.

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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 external titler software effects to Pearl-2

You can use Pearl-2 with titling software that provides chroma key output to add effects like animated lower thirds.

This example shows an HDMI camera connected to the HDMI-A port on Pearl-2 and an effects computer with titler software connected to the HDMI-B port. To the computer, Pearl-2 is treated just like an external display.

You can connect the effects computer with the titling software to any supported port that is available on Pearl-2.

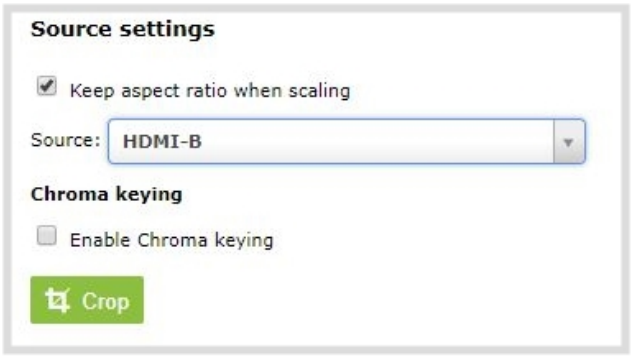
To apply the chroma key effect to a single video source using Pearl-2:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. Follow the steps in Add or edit a custom layout to create a custom channel.
3. From the custom layout editor, click **Add new item** and select **Video Source** from the drop down box.

4. Click **Source** and select the video source that you want showing in the background. For detailed steps, see Add video sources or a channel as a source.
5. In the layout editing area, click and drag to position the video. See the note after this procedure for positioning techniques.

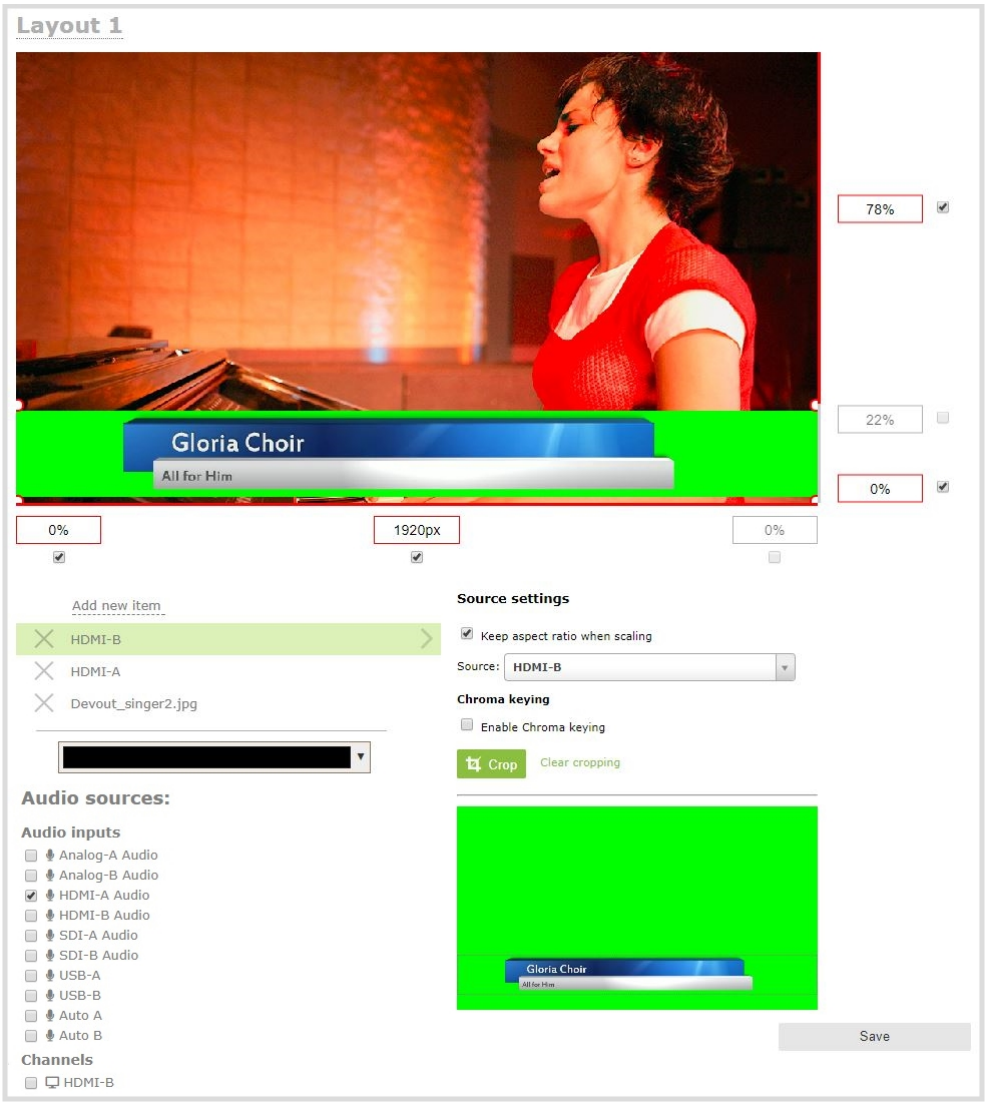
> For best results, select the **Keep aspect ratio when scaling** checkbox from the **Source settings** box.

6. Click **Add new Item** again and add the video source from your effects computer.
7. Click the **Crop** button and crop your effects video source in the pop-up crop editing window. For detailed steps, see Crop a video source. Click **OK** when your done to return to the custom layout editor.

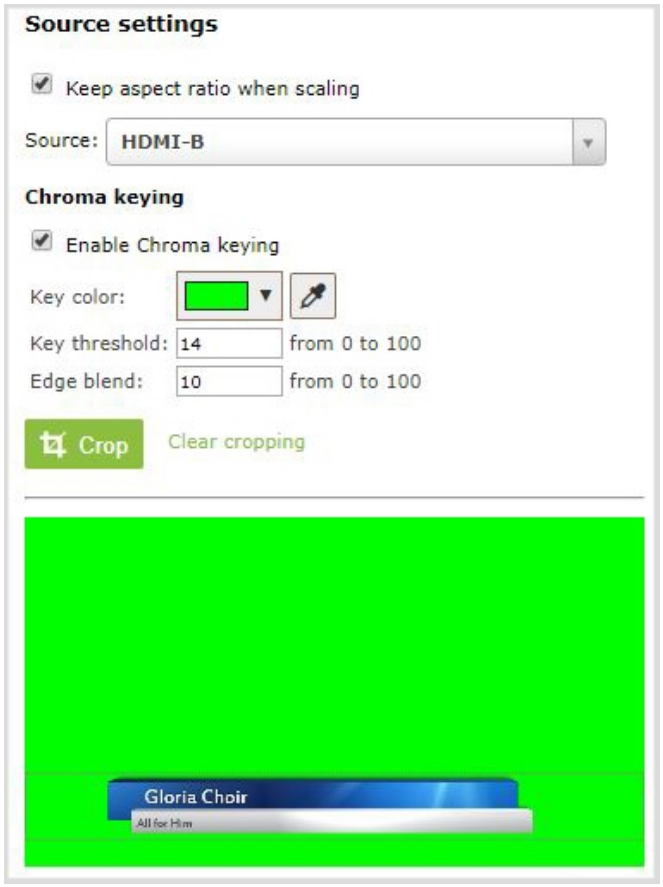


Cropping the effects computer video source helps optimize the performance of Pearl-2.

8. In the layout area, position the effects video source over top the other video source. To optimize performance, avoid scaling the effects video source if you can.



9. With the effects video source selected, check **Enable Chroma keying** in the custom layout editor. The chroma keying options appear.



10. Click the eye dropper and then click on a color in the thumbnail image to choose the chroma key color.

> The background video image shows through all the colored areas on the chroma key video layer that match the color you select as the chroma key.

11. Adjust the chroma color selection and blend the edges to remove unwanted chroma effects or residual color.
    a. Enter a number in the **Key threshold** field to adjust the color selection. A value of 0 equals the original color you selected. A higher value widens the range of the selected chroma color. A lower number narrows the range of the selected chroma color.
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12. Click **Save** when you're done.

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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.

Video and audio input sources

The Admin panel automatically discovers all video and audio sources that you connect to the input ports on Pearl-2 and lists them in the Inputs menu of the Admin panel. RTSP sources need to be added manually to display in the Inputs menu (see Connect an RTSP source). When an RTSP source is added, a corresponding audio sources is always added to your custom layout editor even if the RTSP stream actually contains no audio. See Add an audio source to a layout.

You can also connect RTSP sources such as IP cameras and even other Pearl-2 systems to your Pearl-2 over a network using the Admin panel. See Connect an RTSP source.

A source's content can be video, a picture, or music from a connected audio mixer. Content can originate from a camera, computer screen, an imported image in Pearl-2, or a device that provides a video input 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
- Tested RTSP-based IP cameras
- Supported web cameras
- Connect an RTSP source
- 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 connect and disconnect your video and audio sources while Pearl-2 is powered on and when it is powered off.

You can also connect wireless RTSP sources to your Pearl-2 over a network. Both the RTSP source device and your Pearl-2 need to be powered on to establish a connection. See Connect an RTSP source for more information.

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 46 *Cable and port connections*

Source type	Input port
SDI	SDI port
HDMI (HDCP-protected) or DVI	HDMI port
USB video	USB 3.0 port (rear)
RTSP	No input port. RTSP sources are connected to your Pearl-2 wirelessly over a network and are configured using the Admin panel. See Connect an RTSP source to learn how to connect an RTSP source.
Audio	Audio input port: XLR or RCA

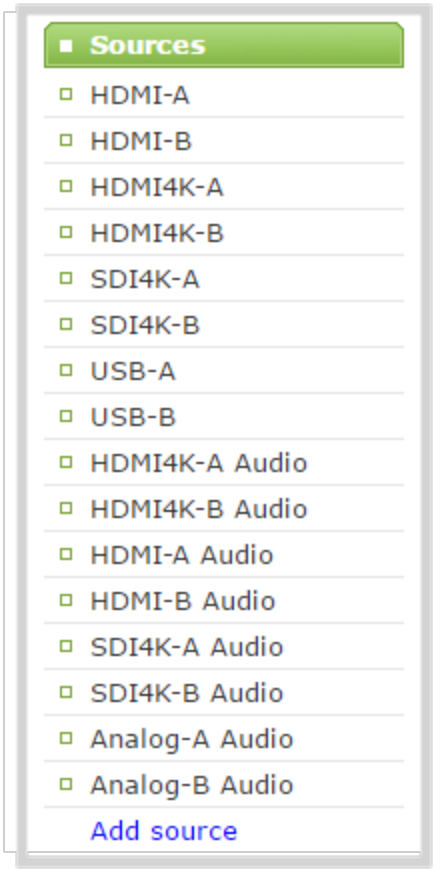
Each video input on the back of the system is identified by an A or B and input type (HDMI, DVI, SDI, USB video). For example, the SDI input labeled A appears as SDI-A in the Web UI. It's good practice to preview the video source for each of your inputs using the Admin panel.

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 or no input stream is being transmitted from a connected RTSP source, "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-2 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-2 and lists them in the Inputs menu of the Admin panel. RTSP sources need to be added manually to display in the Inputs menu (see Connect an RTSP source). When an RTSP source is added, a corresponding audio sources is always added to your custom layout editor even if the RTSP stream actually contains no audio. See Add an audio source to a layout.

You can also connect RTSP sources such as IP cameras and even other Pearl-2 systems to your Pearl-2 over a network using the Admin panel. See Connect an RTSP source.



Pearl-2's Admin panel automatically discovers all audio sources and displays them in the same section. An exception is for RTSP audio sources. When an RTSP input stream is connected to your Pearl-2, a corresponding audio source is automatically added to the list of audio sources for your channels, even if there is no audio in the RTSP stream, see Add an audio source to a layout.

Audio mixers and other line level devices can be connected to the XLR and RCA audio input ports on Pearl-2. Audio from sources connected to the HDMI, SDI, and USB video ports is also supported.

Tested RTSP-based IP cameras

Pearl-2 is compatible with all Ethernet-based IP cameras and other RTSP sources. The cameras listed in the following table represent a sample of common third-party cameras that have been tested to work with Pearl-2. Information such as URL syntax, default credentials and audio streaming capability specific to each camera is included.

The URL syntax refers to the additional piece of text that needs to be included in the source URL to connect your IP camera to Pearl-2, see Connect an RTSP source to learn how to connect an RTSP source like an IP camera using the Admin panel.

For example, to connect a Sony SRG300SE camera with an IP address of "192.168.0.160", your source URL needs to be entered as:

"rtsp://192.168.0.160**/video1**"

Or, if using a Q-See QCN8029Z camera, your source URL needs to be entered as:

"rtsp://192.168.0.160**/**"

Table 47 *List of tested IP cameras*

Brand	Model	Image	URL syntax	Audio?	Default username and password
Q-See	QCN8029Z		/	No	admin admin
Sony	SRG300SE		/video1	Yes	admin admin
Panasonic	AW-HE40HPK*		/MediaInput/h264/stream_1 (To add a second URL, use: "/MediaInput/h264/stream_2")	Yes	admin 12345
Axis	P1428-E		/axis-media/media.amp	No	root root
Axis	M1034-W		/axis-media/media.amp	Yes	root admin

*During testing, the Panasonic AW-HE40 did not consistently synchronize its time with Pearl-2.

Supported web cameras

Pearl-2 supports most webcams and USB audio sources, such as USB microphones. The following list of web cameras have been tested for compatibility with Pearl-2. If your web camera doesn't appear in the list, that just means your model hasn't been tested. It's likely that it will work without any issues.

Table 48 *List of tested Web cameras*

- Logitech HD Pro Webcam C920 (Max video mode: 1920x1080@30)
- Logitech C925e (Max video mode: 1920x1080@30)
- Microsoft LifeCam Studio (Max video mode: 1280x720@30)
- Microsoft LifeCam HD-3000 (Max video mode: 1280x720@30)
- IPEVO Ziggi-HD Plus

For the Ziggi-HD Plus web camera, enable the power line frequency setting in the web camera before connecting the camera to Pearl-2.

When you **Configure a video input source**, the **Default video mode** is not necessarily achievable for that web camera. For instance, a camera might have a default mode of 1080p but have a **Maximum video mode** of 720p. If no settings are changed, the camera simply outputs video at 720p in this case.

Connect an RTSP source

You can connect RTSP sources such as IP cameras and other Pearl-2 systems to your Pearl-2 over a network using the Admin panel. For a list of tested cameras and their URL syntax, see Tested RTSP-based IP cameras.

RTSP video encoding is supported with H.264 video codec and MP3 or AAC audio formats.

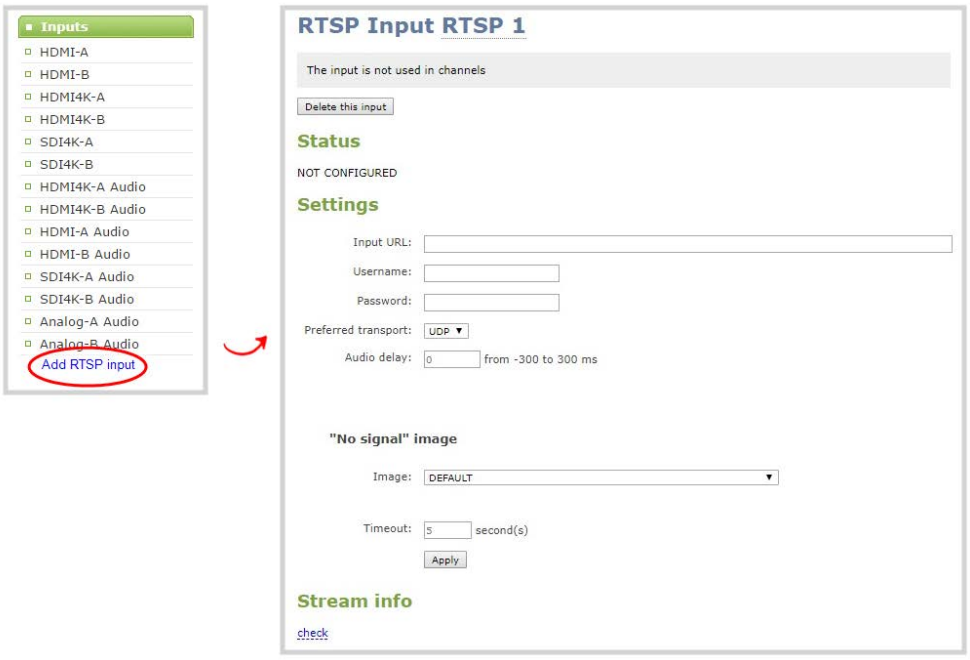
Decoding a 1080p RTSP signal at 30 fps consumes approximately 10% of your Pearl-2's CPU power. If an RTSP source is connected but unused in any channel, Pearl-2 decodes only key frames to preserve CPU resources.

To synchronize timestamps between your RTSP source and your Pearl-2, the same time synchronization server should be used for both devices. We recommend that you configure an NTP server on your Pearl-2 and use Pearl-2 as a time synchronization server for your RTSP source. See Configure a time server.

The timestamps of an RTSP source and Pearl-2 tend to gradually go out of sync. If there's a **2500 –3000 ms** difference between the timestamp of your RTSP source and Pearl-2, a "no signal" image displays and your RTSP source won't stream audio. Re-connect your RTSP source to reset any time synchronization issues.

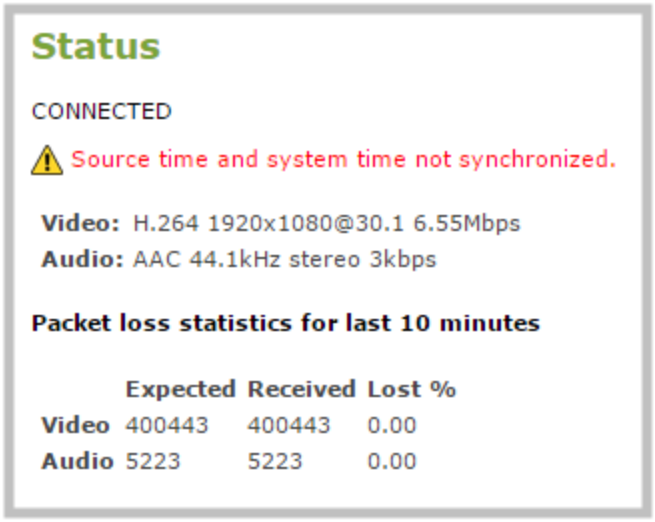
To connect an RTSP source to Pearl-2:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Inputs menu, click **Add RTSP source**. The RTSP input page opens.

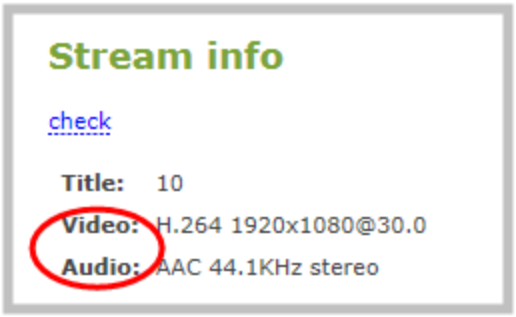


3. Enter the **Input URL**, **Username** and **Password** for your RTSP source and select either **UDP** or **TCP** as the Preferred transport. If you're using another Pearl-2 as an RTSP source, see Stream content using HTTP or RTSP.
4. (Optional) Rename the RTSP source, see Rename an input port.
5. (Optional) Configure a custom "No signal" image, see Add a custom No Signal image .
6. Click **Apply** to save your settings and connect your RTSP source.

After your RTSP source is connected, you can view basic video and audio signal information and packet loss statistics for the source under the **Status** header at the top of the page. Any warnings or errors associated with your RTSP stream are also displayed on this page.



Alternatively, you can view stream connection information when you click **check** at the bottom of the page.



Connect an AV.io video grabber

You can connect an Epiphan AV.io frame grabber to a USB input port just the same as you would connect a web camera.

Pearl-2 treats the video source from the frame grabber just like any other video source.

Use AV.io frame grabbers to connect extra HDMI, DVI, or SDI sources. Using AV.io HD, you can add up to two VGA sources to Pearl-2.

You can set up and operate frame grabbers using the same Configure a video input source

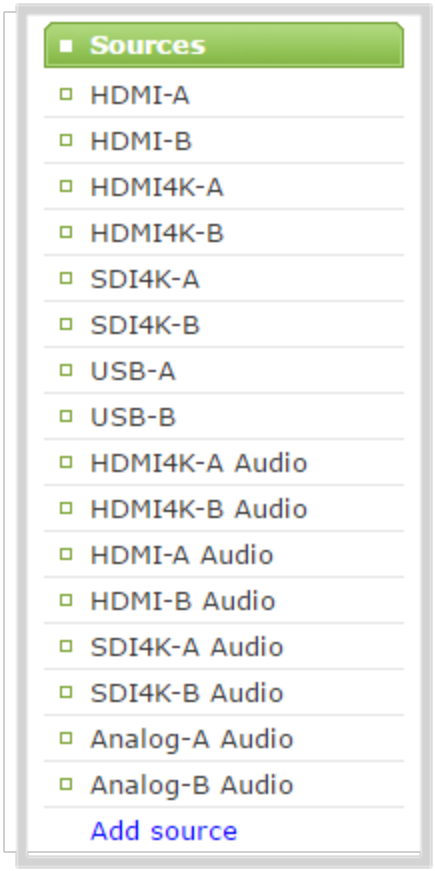
- **AV.io HD**: https://www.epiphan.com/userguides/avio-hd/Content/Home-AVioHD.htm
- **AV.io SDI**: https://www.epiphan.com/userguides/avio-sdi/Content/Home-AVioSDI.htm
- **AV.io 4K**: https://www.epiphan.com/userguides/avio-4k/Content/Home-AVio4K.htm

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

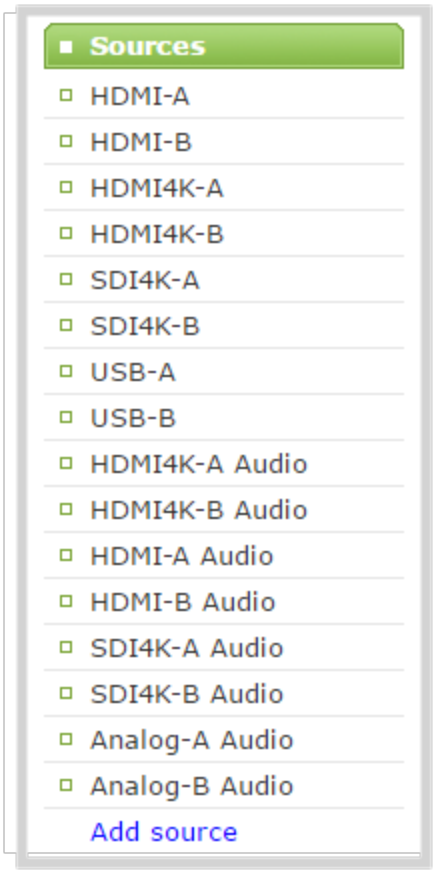
The input port names are used when adding your video and audio sources to channels. A channel that has only one source is automatically assigned the same name as the input source by default. If you change the name of the input source, the channel name will update automatically to match.

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.



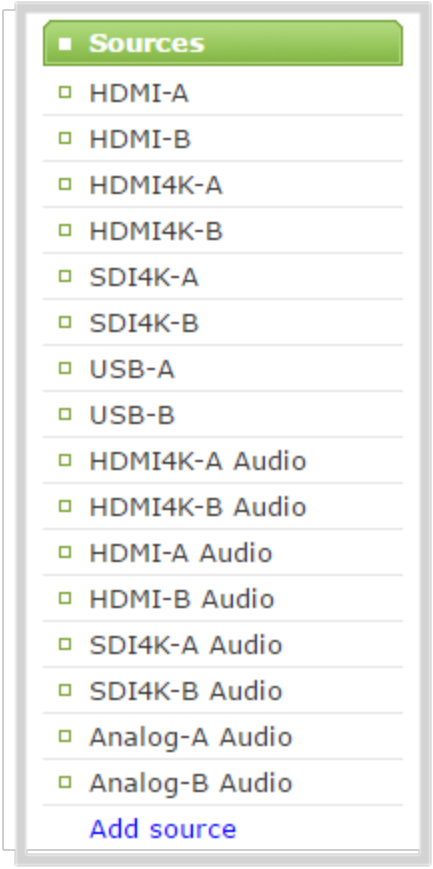
3. Click on the input port's name that appears at the top of the page. The text turns red.
4. Enter the new name using alphanumeric characters. We recommend using underscores to separate words rather than using spaces.
5. Press **Enter** using your keyboard to save the new name.

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.

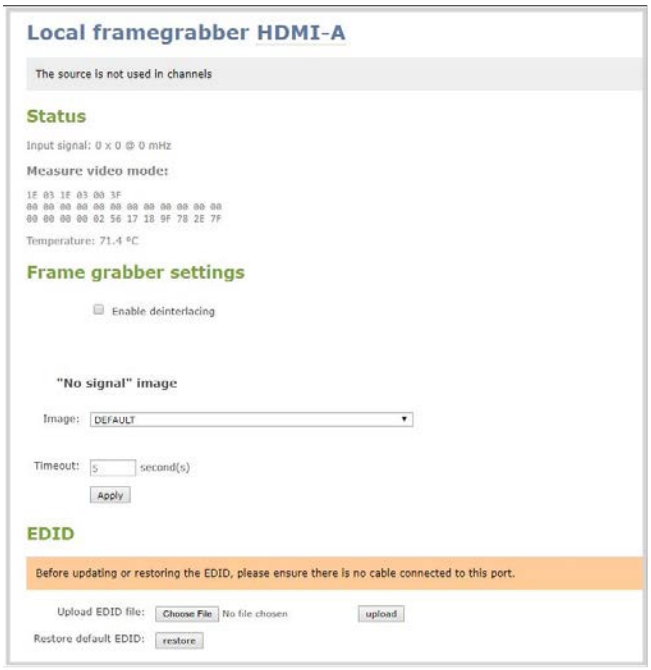
To open the configuration page for an input source:

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.



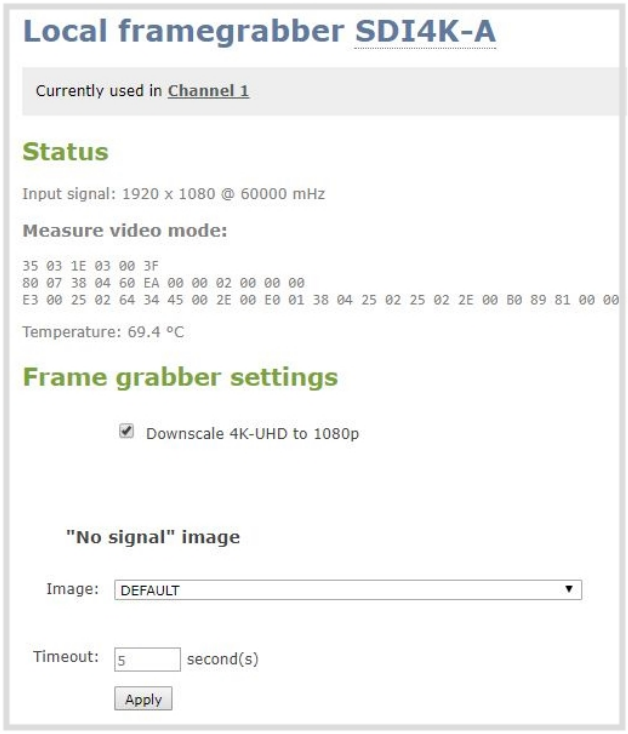
DVI and HDMI signals

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.
Enable 4K downscaling[4K]	Selecting this option means that your 4K UHD[1] source will be automatically downscaled to 1080p using Pearl-2's hardware.
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.

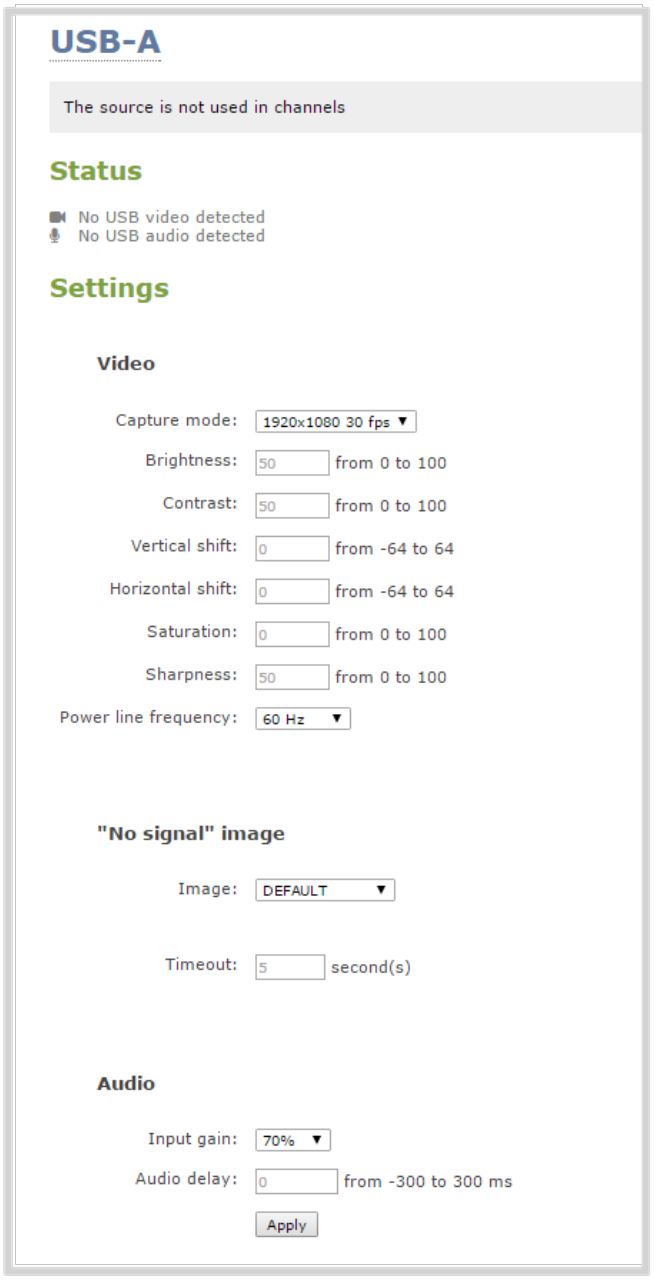
[1]Requires 4K feature add on



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.

USB signals

The following options are all potentially available for signals via the USB port. However, some apply only to certain types or brands of camera, and not all options are available or needed for all cameras.



Value	Description
Capture mode	This feature is useful for simultaneously dictating the resolution and fps at which the camera is captured. The drop down list of available resolutions and frame rates changes depending on the attributes of the connected device.
Brightness	The brightness of the video can be adjusted by entering a numerical value from 0 to 100. Estimate values and view the result in the preview area until desired result

Value	Description
	is achieved.
Contrast	The contrast of the video can be adjusted by entering a numerical value from 0 to 100. Estimate values and view the result in the preview area until desired result is achieved.
Vertical shift	The vertical positioning of the video can be adjusted by entering a numerical value from -64 to 64. Estimate values and view the result in the preview area until desired result is achieved.
Horizontal shift	The horizontal positioning of the video can be adjusted by entering a numerical value from -64 to 64. Estimate values and view the result in the preview area until desired result is achieved.
Saturation	The saturation of the video can be adjusted by entering a numerical value from 0 to 100. Estimate values and view the result in the preview area until desired result is achieved.
Sharpness	The sharpness of the video can be adjusted by entering a numerical value from 0 to 100. Estimate values and view the result in the preview area until desired result is achieved.
Powerline frequency	The powerline frequency of the video can be adjusted by selecting the desired output from a drop-down list of frequencies available to your source.
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.
Audio input gain	You can add audio gain to your source from this page by selecting the % gain from the drop-down list. Estimate values and check the result in the preview area until desired result is achieved.
Audio delay	If your audio is not synchronized with your video, it can be adjusted from -300 to 300 ms. Estimate values and check the result in the preview area until desired result is achieved.

RTSP sources

RTSP sources are configured for connection to your Pearl-2 using the **Source URL**, **Username** and **Password** specific to your selected RTSP source. (See Connect an RTSP source for more information).

RTSP sources can be further configured with a **Preferred transport** protocol (either UDP or TCP) and a custom "No signal" image. (See Add a custom No Signal image).

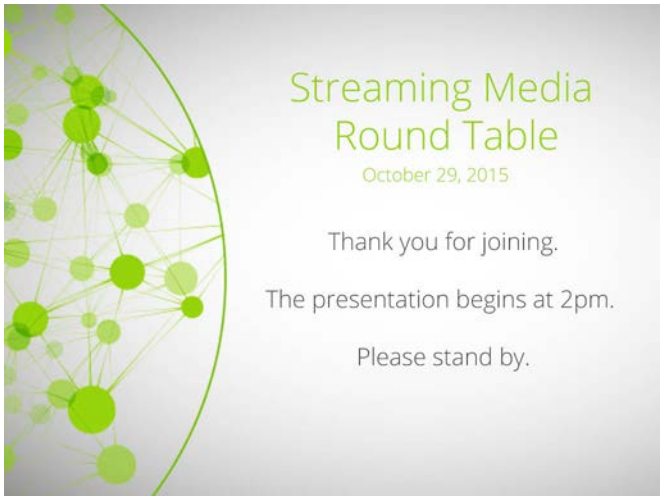
Add a custom No Signal image

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-2. 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-2, 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-2 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-2 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-2 can stream to individual viewers using HTTP, HTTP Live Streaming, UPnP, and RTSP. At the same time, Pearl-2 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-2 (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-2.

Table 49 *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	4 Mbps for HD; 6 Mbps for Full HD; 12 Mbps for 4K UHD[4K]
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 50 *Suggested stream settings for slides*

Option	Setting
Codec	H.264
Video encoding preset	Hardware accelerated
Video encoding profile	High
Key frame interval	2 sec
Limit frame rate	30

Option	Setting
Bitrate	4 Mbps for HD; 6 Mbps for Full HD; 12 Mbps for 4K UHD[4K]
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-2 directly to your viewers, who can tune in and watch your program using their web browser or media player.

Table 51 *Publishing options for streaming to viewers*

Publishing Options	Use this option to...
HTTP	Quickly stream content to viewers simultaneously. Pearl-2 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-2. For more information about using a HTTP streaming, see Stream content using HTTP or RTSP.
RTSP	Quickly stream content to viewers. Pearl-2 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.
HTTP Live Streaming (HLS)	Stream live over the standard HTTP port 80, making it possible to cross firewalls and proxies that are normally accessible to other HTTP traffic and facilitates content delivery to CDNs, see Stream content using HLS (HTTP). There is approximately a 30 second delay when streaming using HLS.

To stream video outside of your LAN, you must configure port forwarding on your router. Consult with your Network Administrator.

To set up Pearl-2 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 content using HLS (HTTP)
- 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-2, which can be done though network discovery using the serial number or the IP address of Pearl-2.

Pearl-2 must be accessible on the viewer's LAN for them to access and view the stream by serial discovery.

If Pearl-2 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 52 *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.

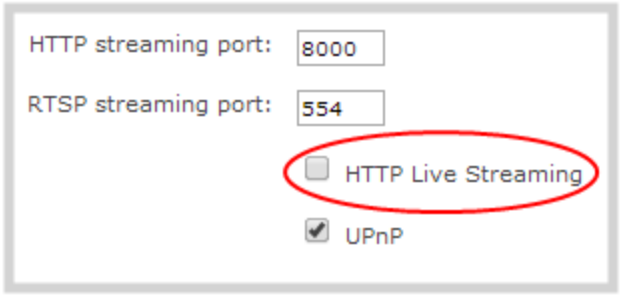
If you're seeing URLs with serial numbers instead of IP addresses and want to change this, log into the Admin panel by IP address (instead of by Serial number/Bonjour Print Services) to see URLs with the IP address, see **Connect to the Admin panel**.

Stream content using HLS (HTTP)

Stream live over the standard HTTP port 80 for access through firewalls and proxies that are normally accessible to other HTTP traffic.

HLS is supported with the H.264 codec and MP3 or AAC audio encoding. When streaming using HLS, there is approximately a 30 second delay.

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Channels menu, select the channel containing video you want to stream and click **Streaming**. The Streaming configuration page opens.
3. Check **HTTP Live Streaming** and click **Apply**.



4. From the Channels menu, click **Status**. The channel's status page opens.
5. Provide the HLS stream link to your viewers.

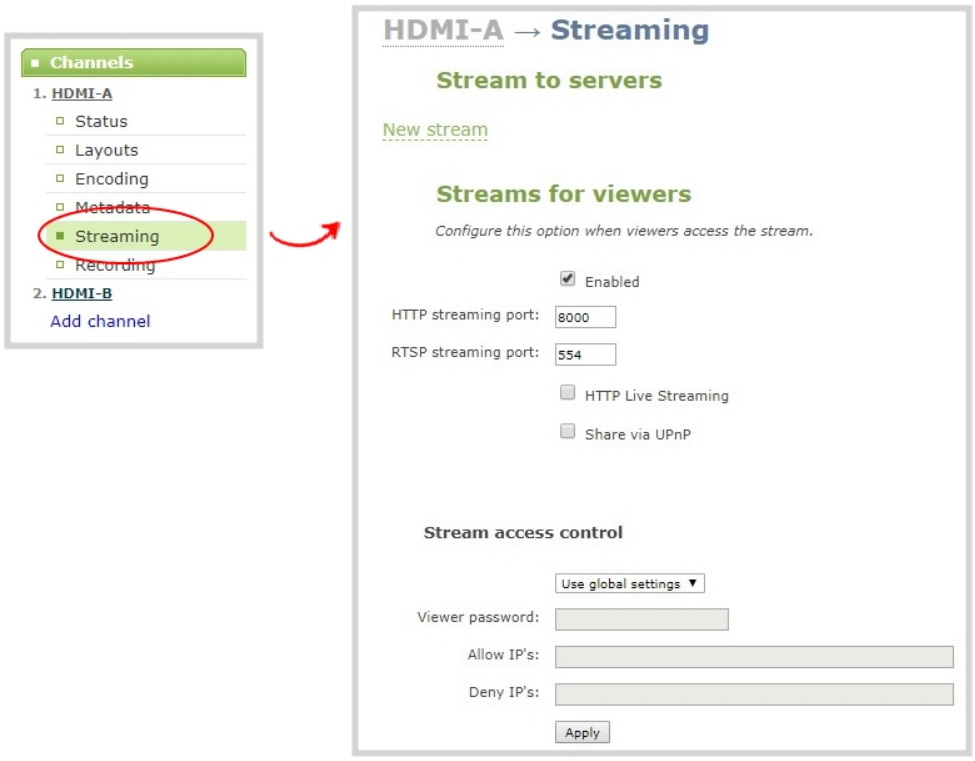
Configure HTTP and RTSP streaming ports

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**.

Directly share stream URLs with viewers

Participants can view a channel's stream directly from Pearl-2 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.

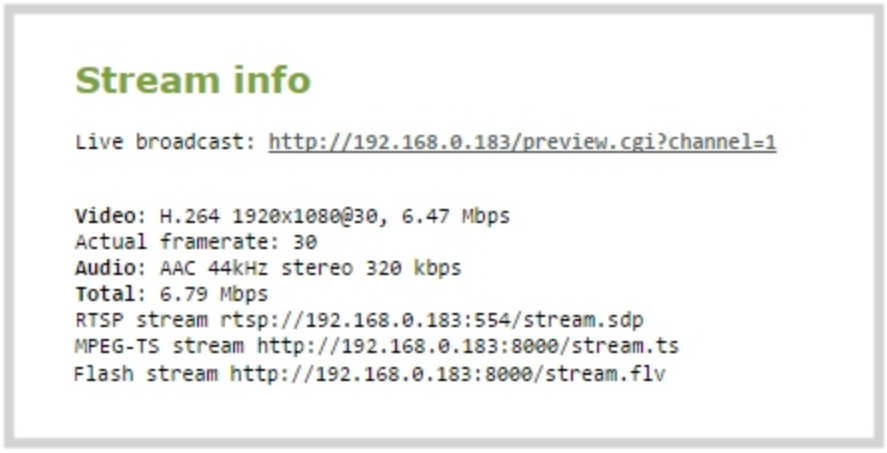
Choose the right type of URL for the type of device the participant will use to view the stream. For more information on compatibility between codec and file formats, see View supported streaming formats.

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.



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-2 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:

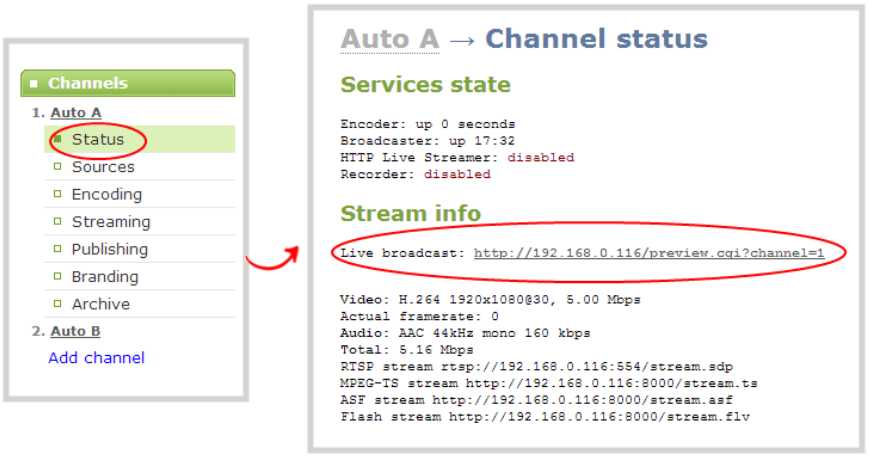
- On the channel's status page.
- On the Info page from the Configuration menu.

To locate the IP address for the broadcast, see Directly share stream URLs with viewers.

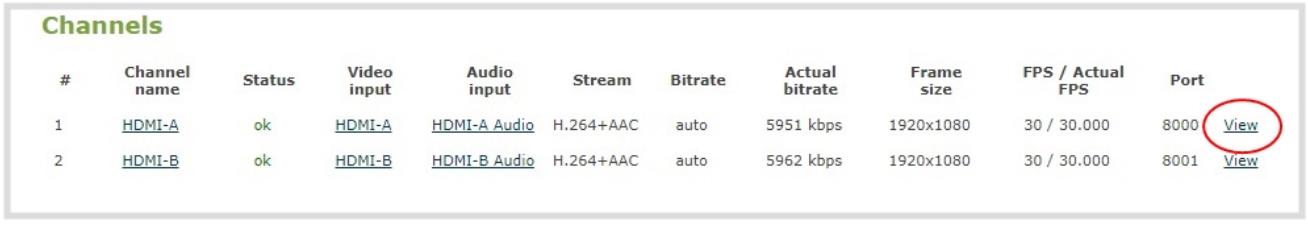
If a viewer password is configured, provide participants with the password to log in, along with the URL of the stream. To set a viewer password, see Set or change user passwords.

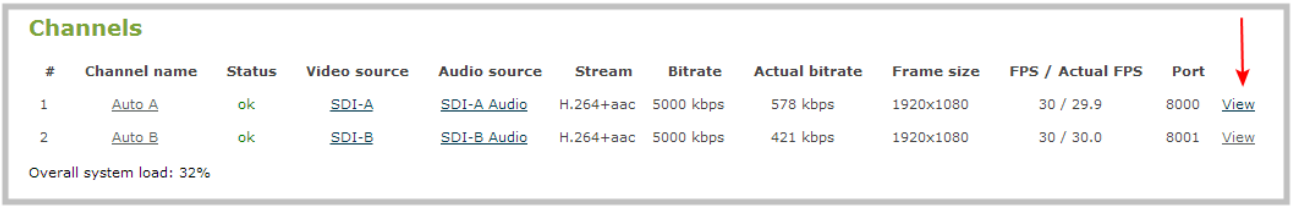
To share the live broadcast URL with viewers:

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.

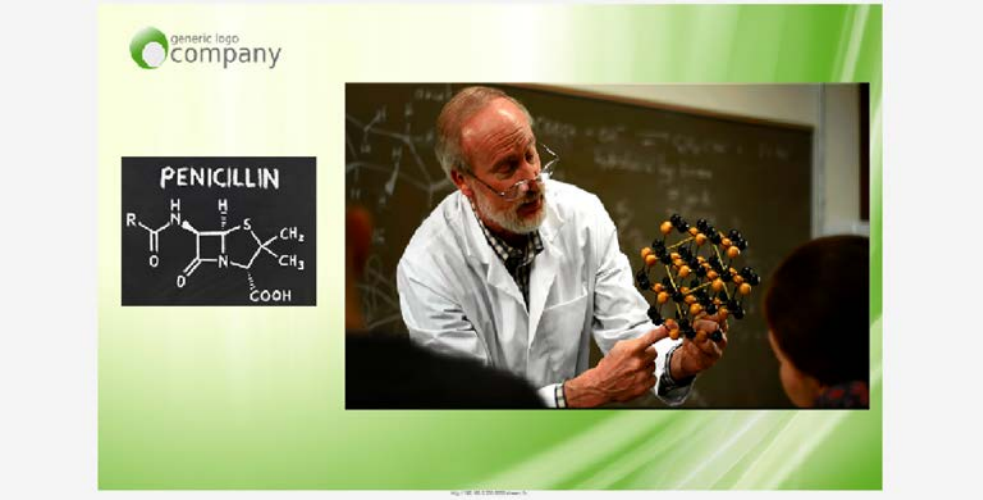


3. Alternatively, open the **Info** page to get the live broadcast URL. From the Configuration menu, click **Info** and then click **View** for the channel you want to share the broadcast URL.





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-2 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-2 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.

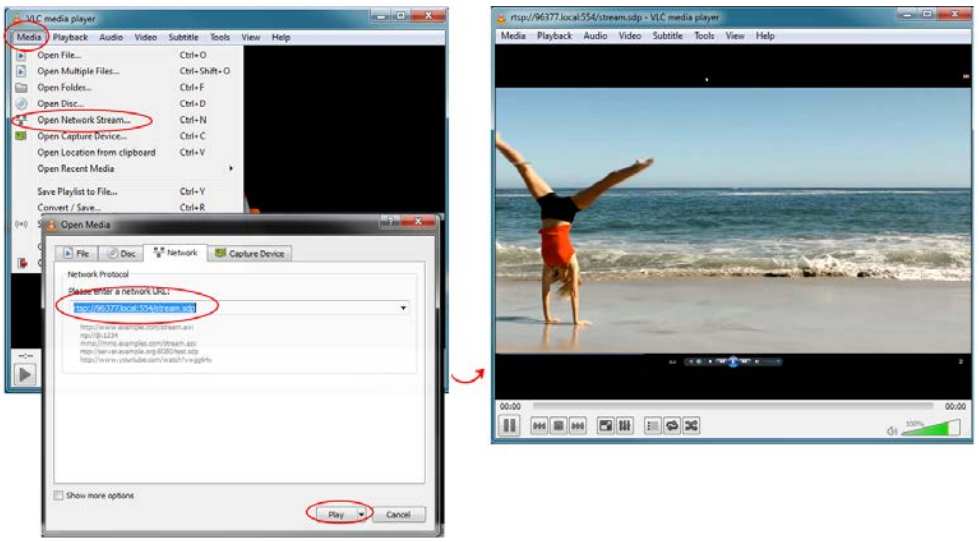
To share the channel's stream URL with viewers:

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://49E7B8E4.local:554/stream.sdp



4. Press **Play** to watch the stream in the media player window.

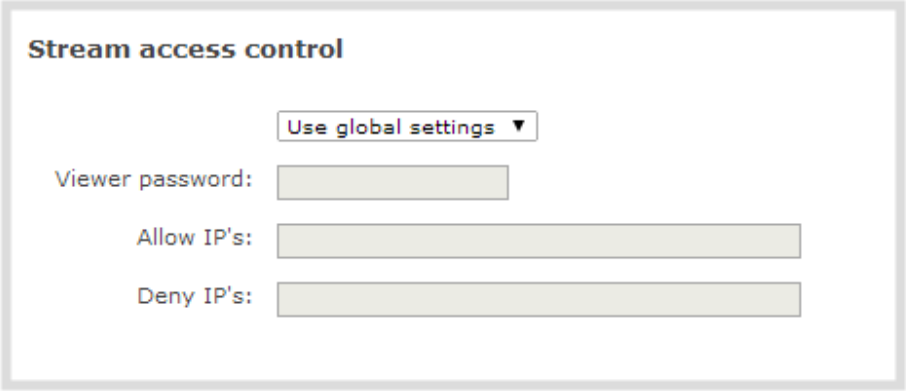
Restrict viewer access to channel streams

Pearl-2 can restrict access to all viewer streams from the channels on Pearl-2 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-2 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 53 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 54 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 55 *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

Disable and enable direct channel streaming

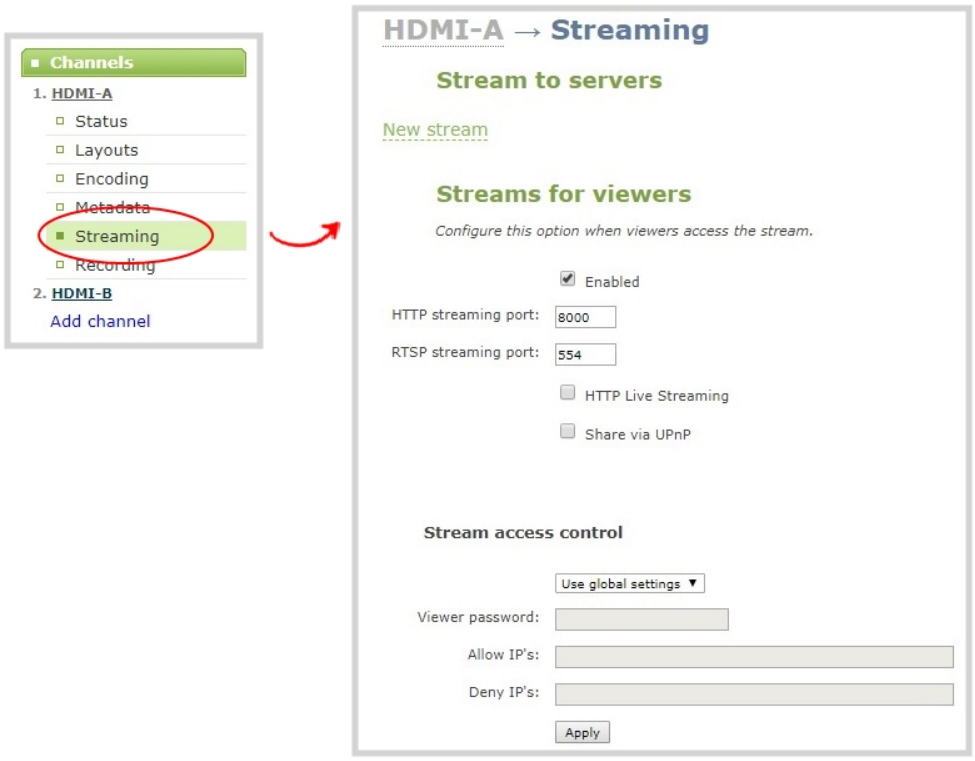
When you create a channel, the channel's streaming URLs are enabled by default. The channel streaming URLs are listed on the Status page for the channel, which you can share with viewers. You can disable channel streaming using the channel's streaming URLs from the Streaming configuration page using 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**.

Streaming to a server

Your Pearl-2 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
- 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-2 for publishing to a CDN:

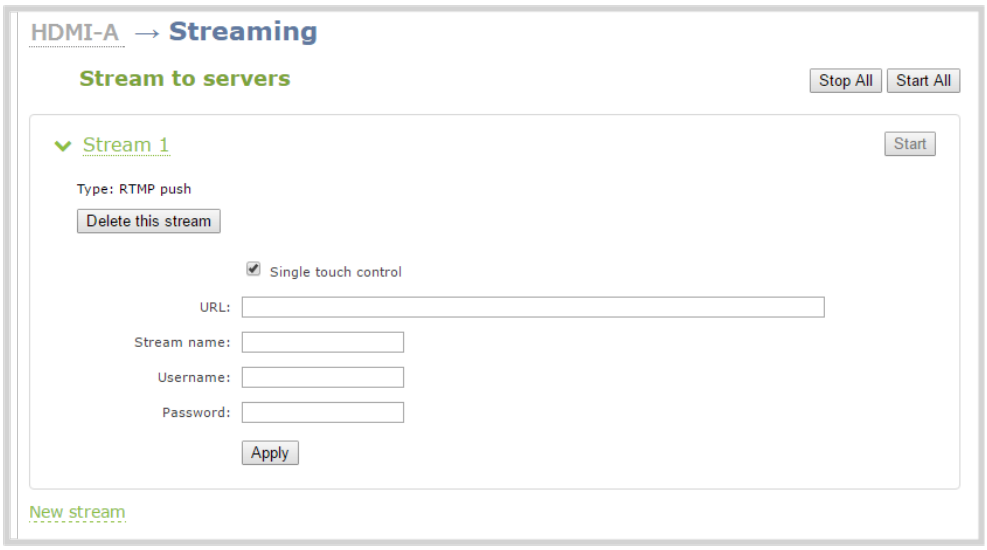
- Set up a stream using RTSP announce
- Set up a stream using RTMP push
- Stream to a CDN using an XML profile
- Stream to Wowza Streaming Cloud

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.

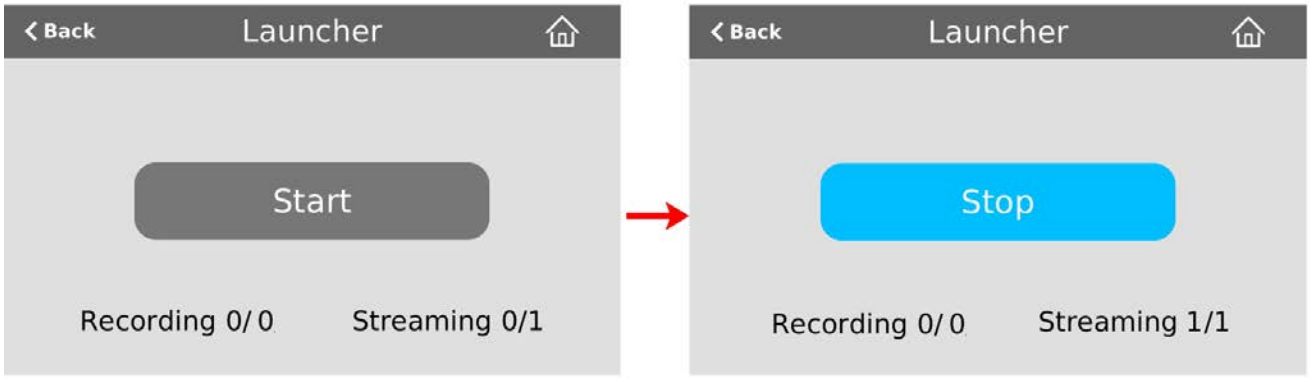
You can tell if your channel is streaming from the touch screen on Pearl-2 when you look at the channel view or the Grid view. The following shows an example Grid view.

- 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.

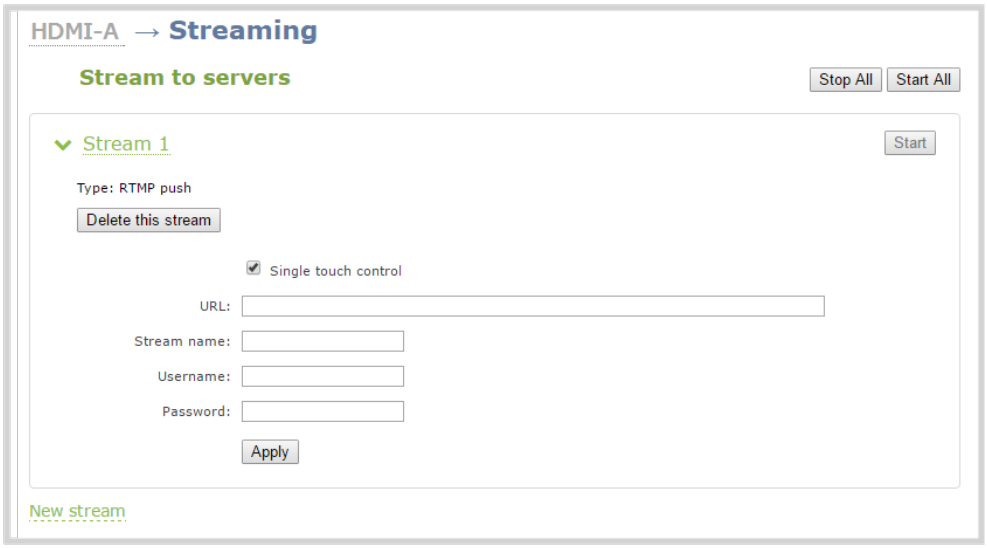


Set up a stream using RTMP push

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).

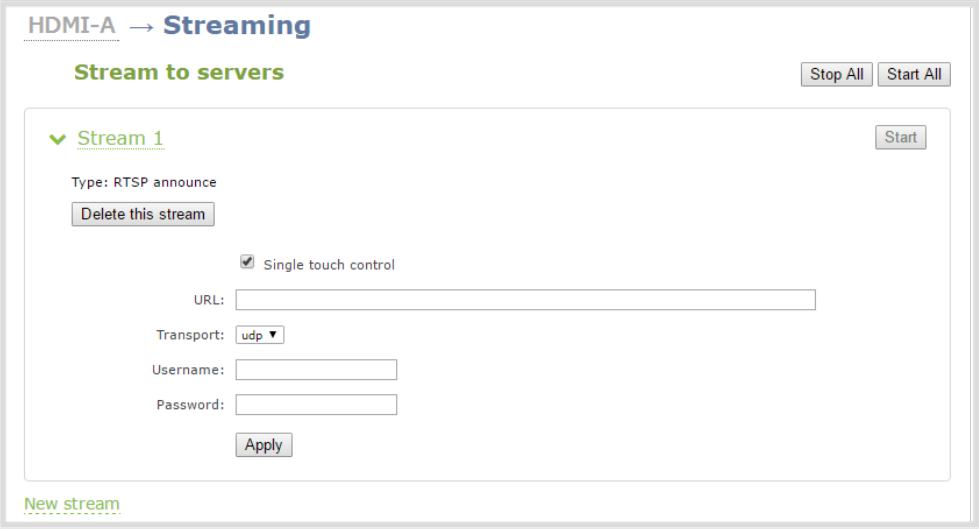
The CDN provider assigns a user name and password to authenticate the publisher. Contact the CDN provider for your log in credentials. Some CDNs, like YouTube and Facebook Live, you do not need to enter your log in credentials here.

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.

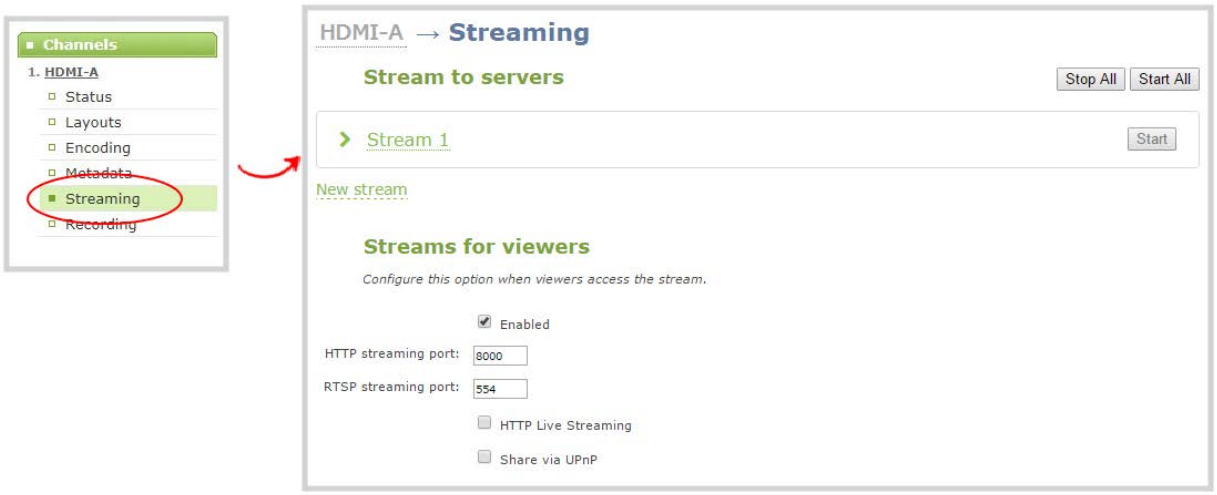
See Start and stop streaming to a CDN for instructions to control streaming from the touch screen or see Control streaming and recording for instructions to use Epiphan Live.

Stream to a CDN using an XML profile

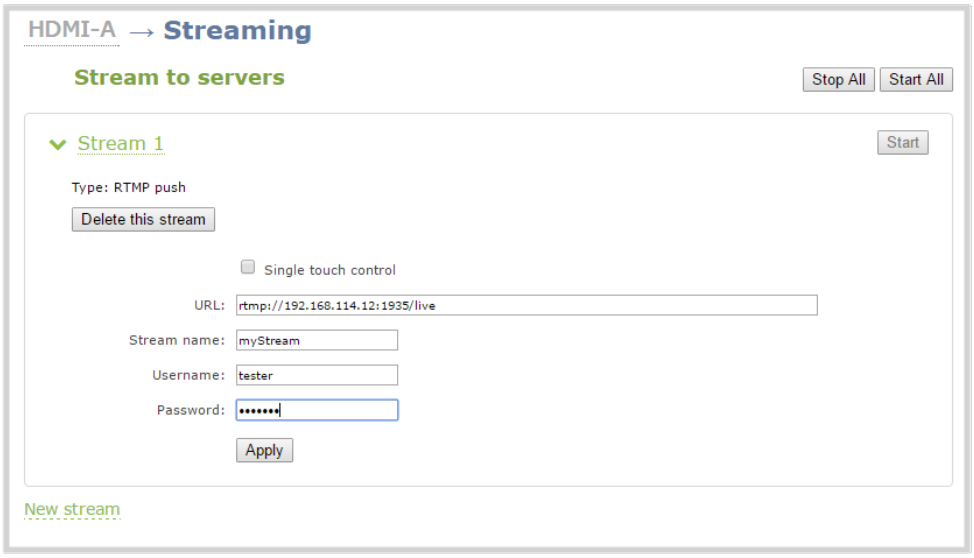
Some CDNs provide an XML file for easy configuration.

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.

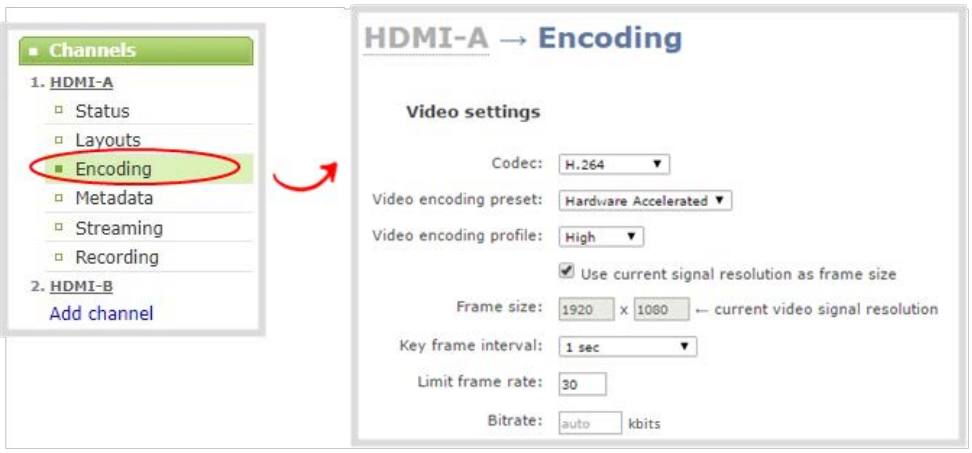
See Start and stop streaming to a CDN for instructions to control streaming from the touch screen or see Control streaming and recording for instructions to use Epiphan Live.

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.

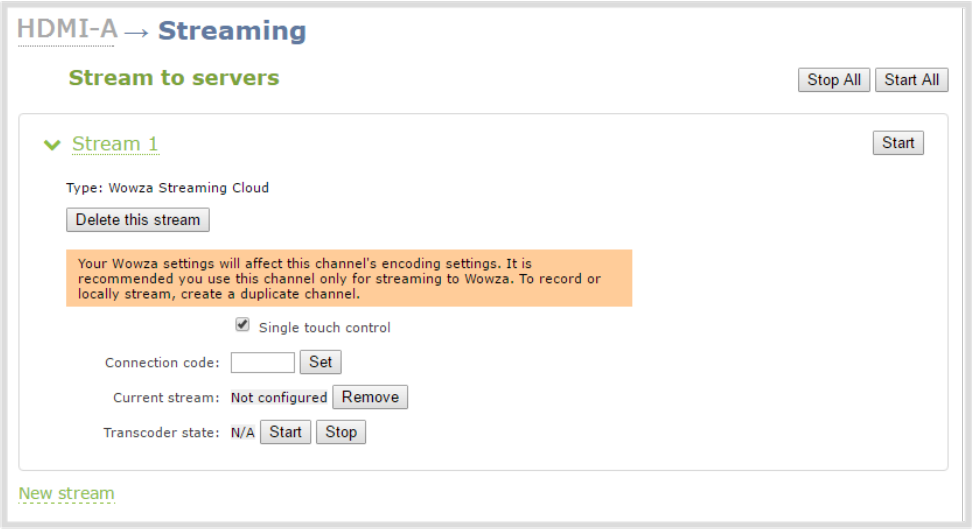


3. Configure the video Encoding settings and ensure that the **Codec** H.264 is selected.

Configuring audio is optional. Supported formats are limited to MP3 and AAC. Due to RTMP restrictions, MP3 48 kHz is not supported.

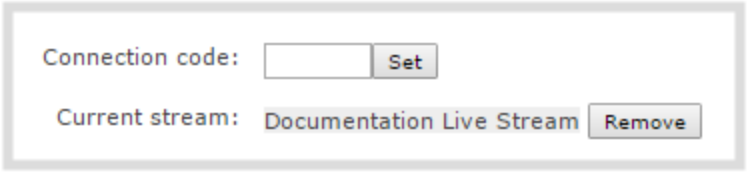
4. Click **Apply**.
5. Click **Streaming** for the channel. The Streaming configuration page opens.

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.

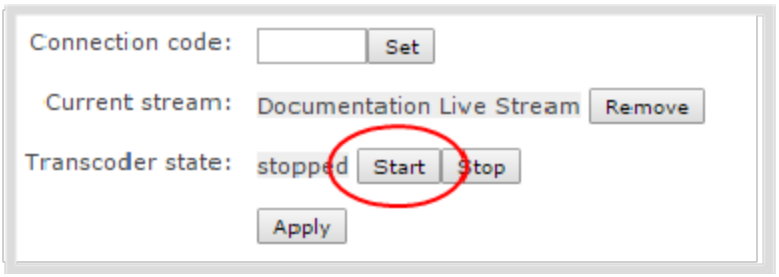
8. Click **Set** to pair the channel on Epiphan's encoder with the live stream on Wowza Cloud. Once validated, the stream name you configured in the Wowza Cloud appears.



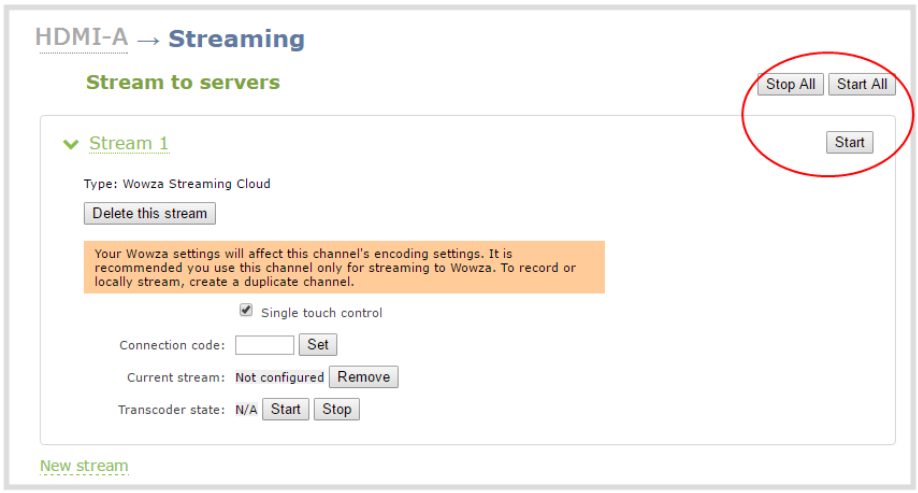
9. To start streaming, do the following:

    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**.

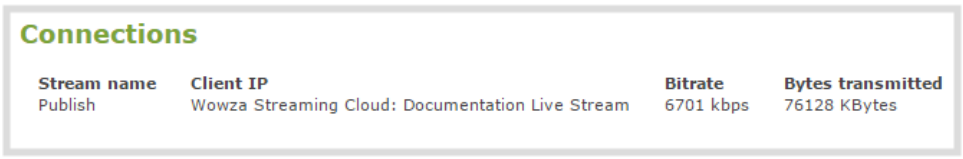
This action starts your session charges with Wowza Cloud.



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.



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.

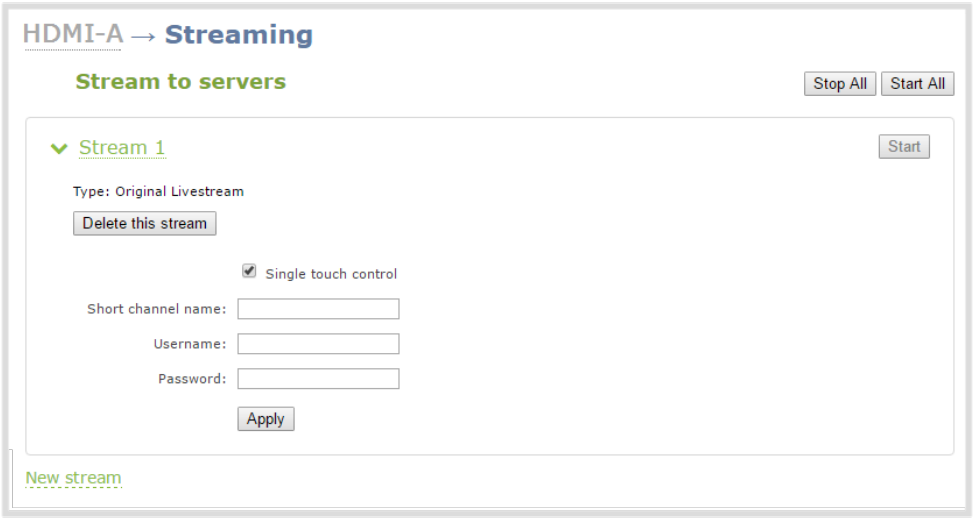
To setup streaming to the original Livestream:

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-2 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

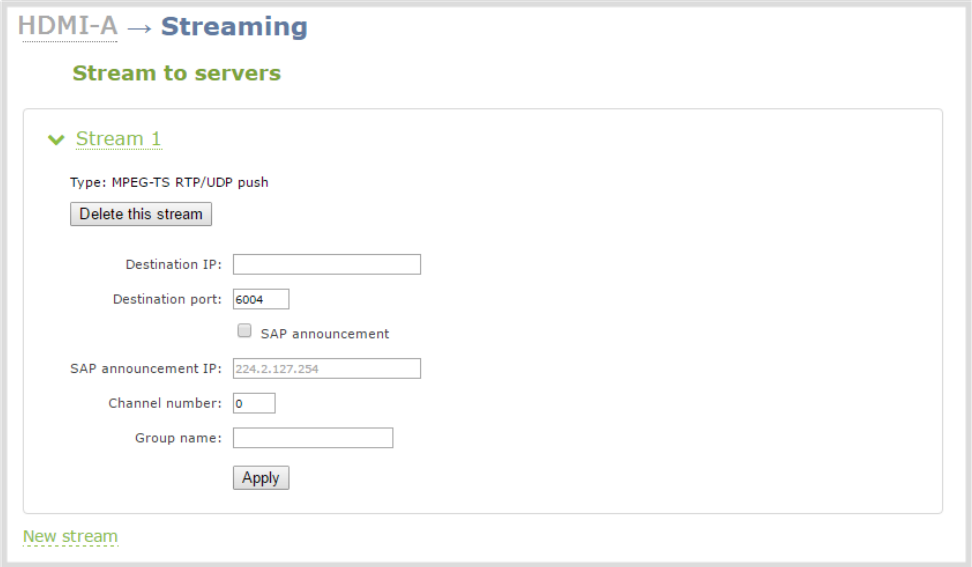
MPEG-TS streams using RTP/UDP push

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).

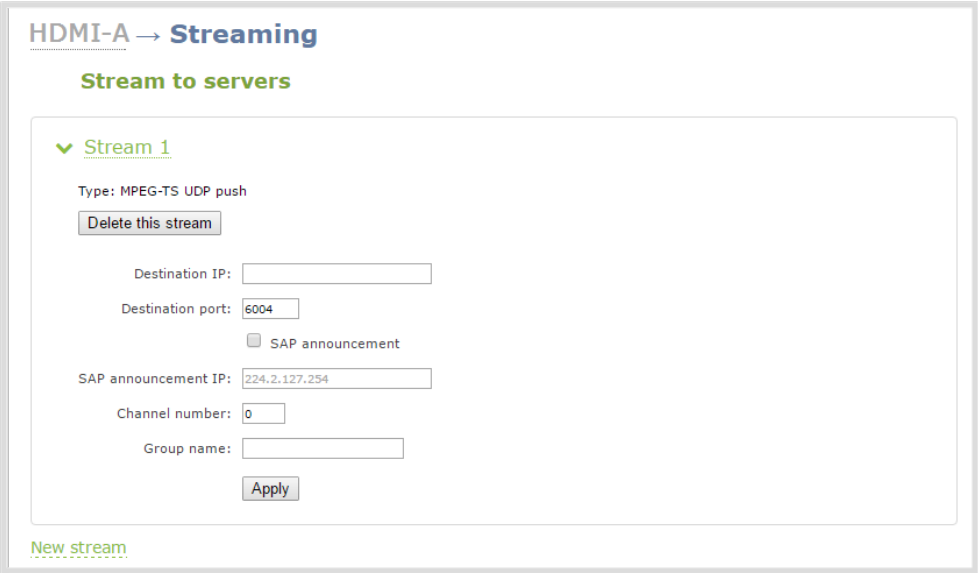
MPEG-TS streams using UDP push

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**.

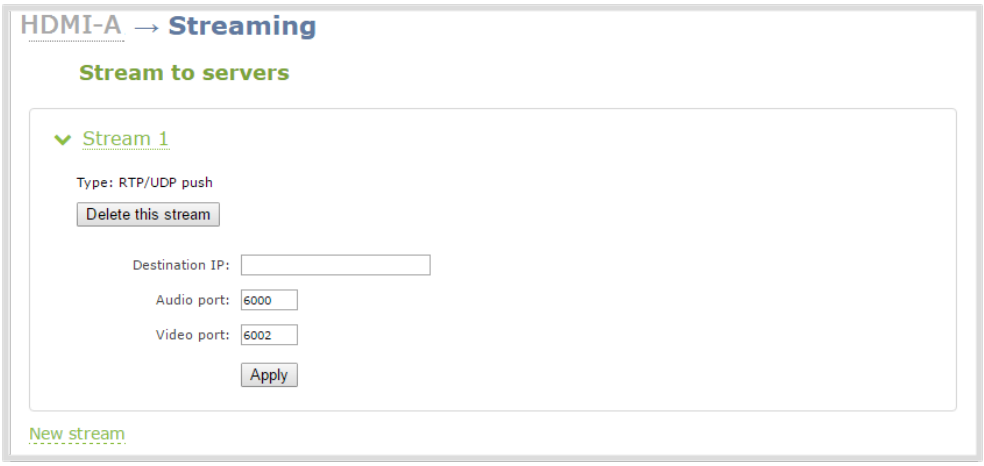
To view the stream, open the URL in a media player, for example:

> 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.

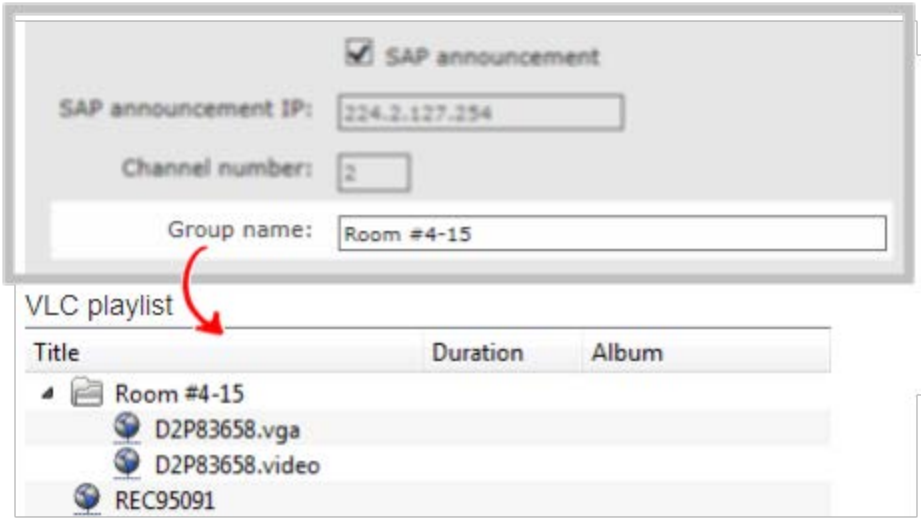
When browsing from a VLC media player, streams are advertised by their channel identifier and are organized by the group name. When browsing from an XBMC media player, streams are advertised by the stream's metadata title (if configured), otherwise streams are advertised by their channel identifier.

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-2 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-2 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-2 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-2 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-2.

There are two steps to enable UPnP on Pearl-2:

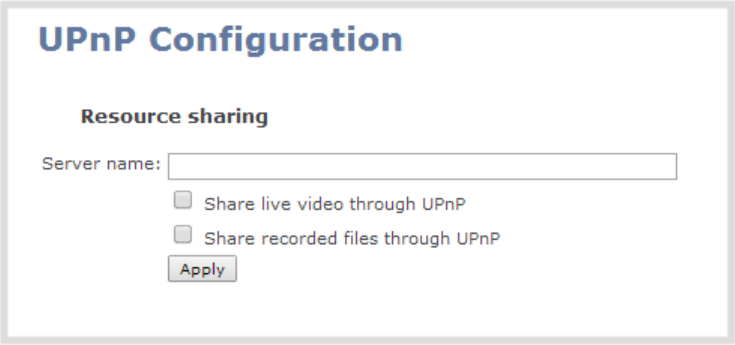
- Enable UPnP at the device level (including setting a share name)
- Enable UPnP for channels and recorders

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

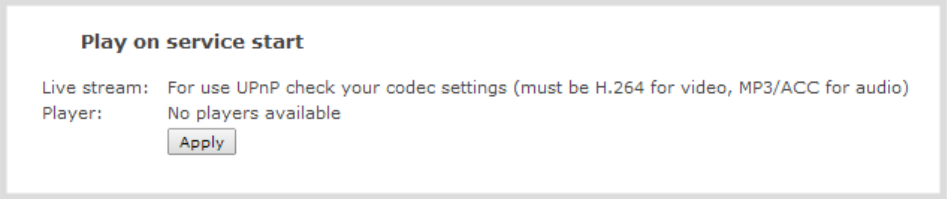
To enable UPnP sharing for the device:

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.

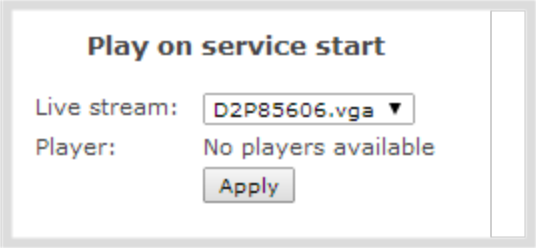


4. Enter a name in the **Server name** field. If no name is provided the server name will be the serial number of Pearl-2.
5. Select whether you want to share live video and recorded files and click **Apply**.

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.

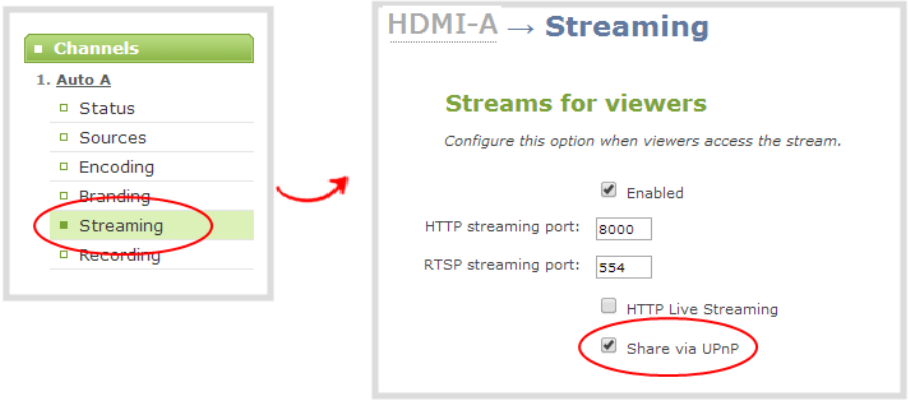


Enable UPnP for channels and recorders

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.

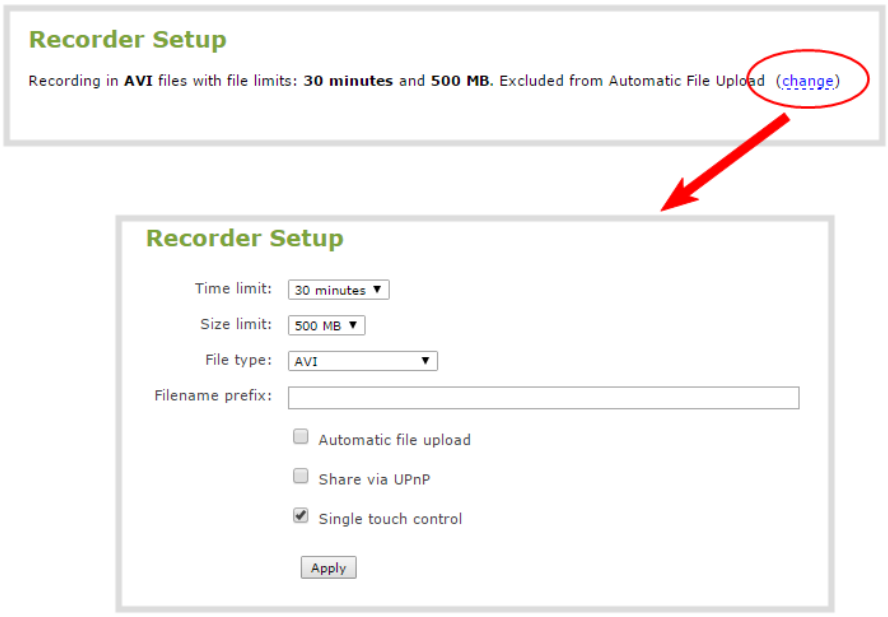
To enable UPnP sharing for channels and recorders:

1. For channels (live streaming):
    a. Click **Streaming** for the channel. The Streaming configuration page opens.
    b. Check **Share via UPnP** and click **Apply**.



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**.

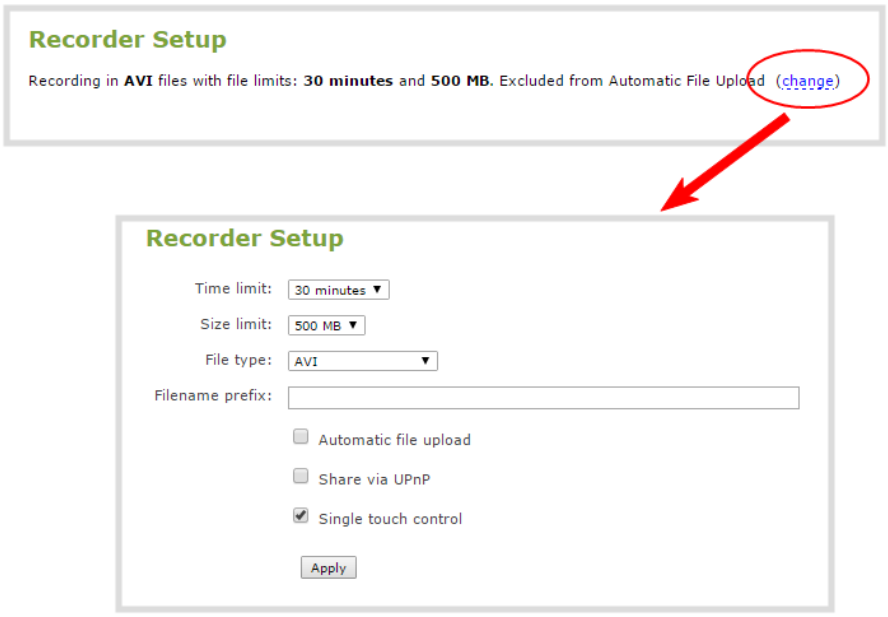
2. For channels (recorded files):
    a. Click **Recording** for a channel. The channel's recording page opens.
    b. Click **change** under Recorder Setup. The recording setup options opens.



    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**.

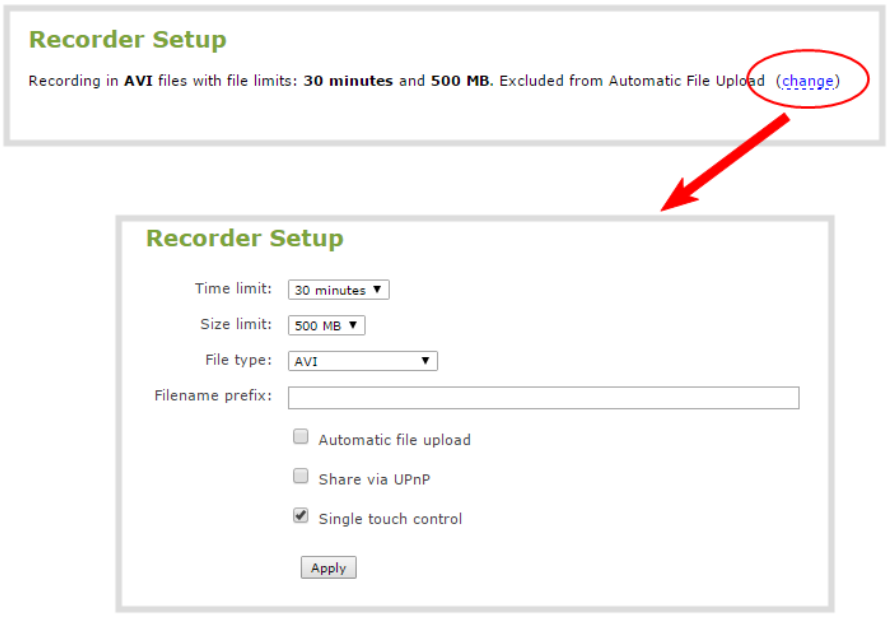
You can now browse for your server from your digital media player.

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

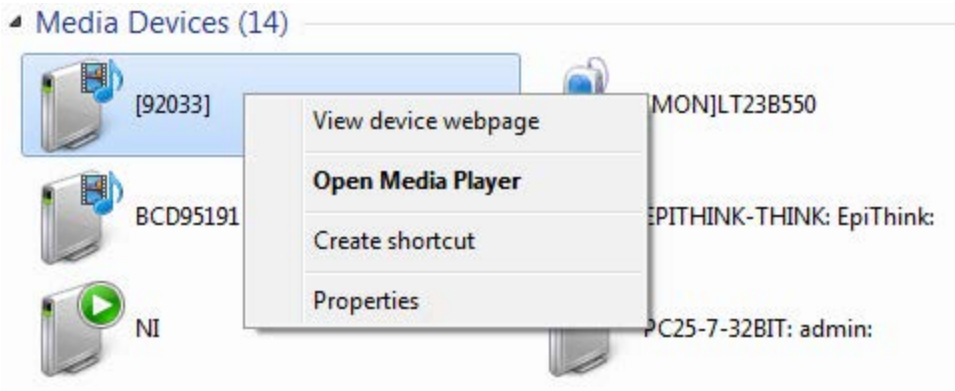
Using a software or hardware media player, you can browse for files or streams with Universal Plug and Play (UPnP). UPnP uses MPEG-TS over HTTP with the H.264 codec and MP3 or AAC audio encoding (or no audio). You can only access live streams or recordings that meet these requirements.

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-2 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-2:



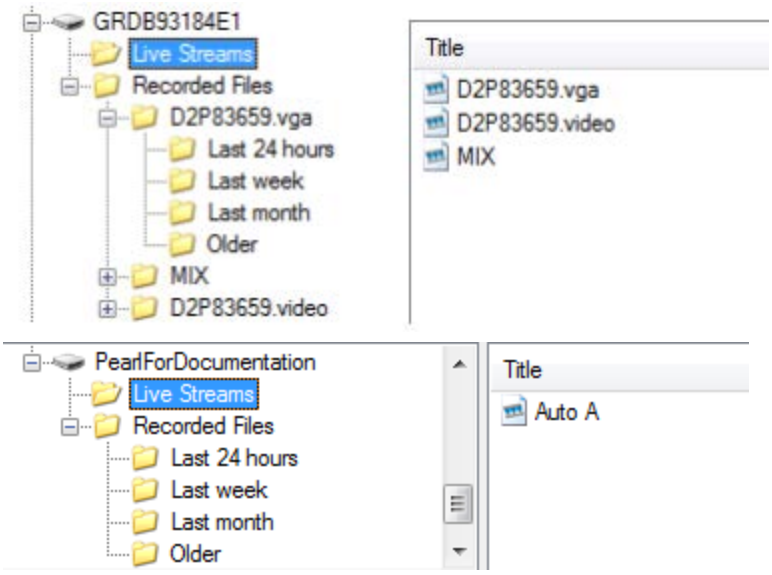
Live streams

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-2. 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-2 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-2 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-2 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-2. 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-2 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 high quality recordings of each of the video inputs at full frame with a high bitrate for future re-use and post-processing.

Recorded files are stored on Pearl-2's hard drive. Plus there are a variety of automatic and manual mechanisms available to download the files.

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-2 as AVI, MOV, MPEG-TS, MP4, or MP4-Fragmented. You can also setup multi-track recorders, see Recorders.

Recording using Pearl-2 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 auto channels, a new recording is made when the input changes from one to another due to signal loss. 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. To control recordings remotely, see Control recording using AV Studio

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-2 comes with APIs so you can setup third party tools to control recording, see Controlling Pearl-2 using HTTP commands and Controlling Pearl-2 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.

Newer recordings overwrite oldest recordings when the hard drive is full.

Epiphan has tested recordings with the following players. See Troubleshooting Quick Reference for known player issues.

Table 56 *Tested Media Players*

Operating System	Tested Players
Mac OS	• QuickTime 10.3 • QuickTime 7.6.6+ • VLC 2.2.4

Operating System	Tested Players
	• 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)

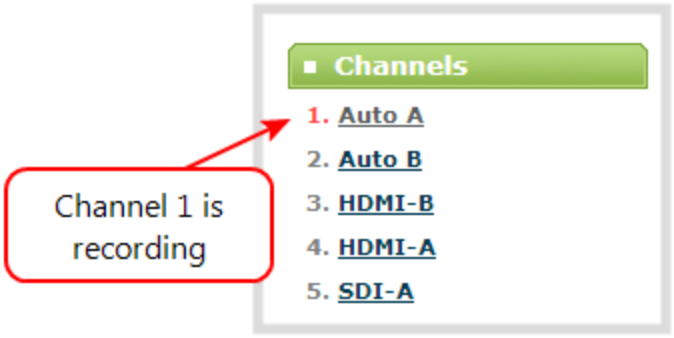
Not all media players and editors support all recording formats, such as the more modern MP4-fragmented format. To playback MOV files created by Pearl-2, we recommend using a newer media player.

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-2 (see Record a channel using the touch screen) and using Epiphan Live (see Control streaming and recording).

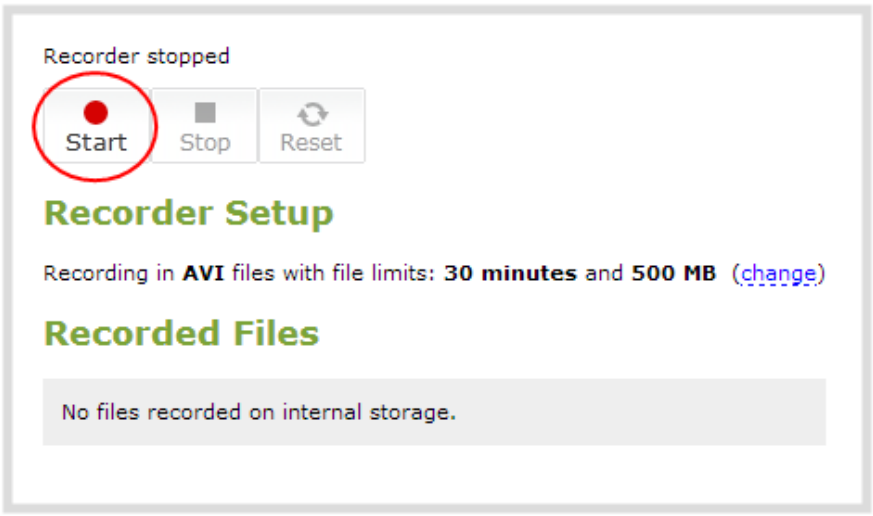
The channel number turns red to indicate it is recording. If the system runs out of storage space, the oldest recorded file is deleted to make room for the new recording.



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.



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

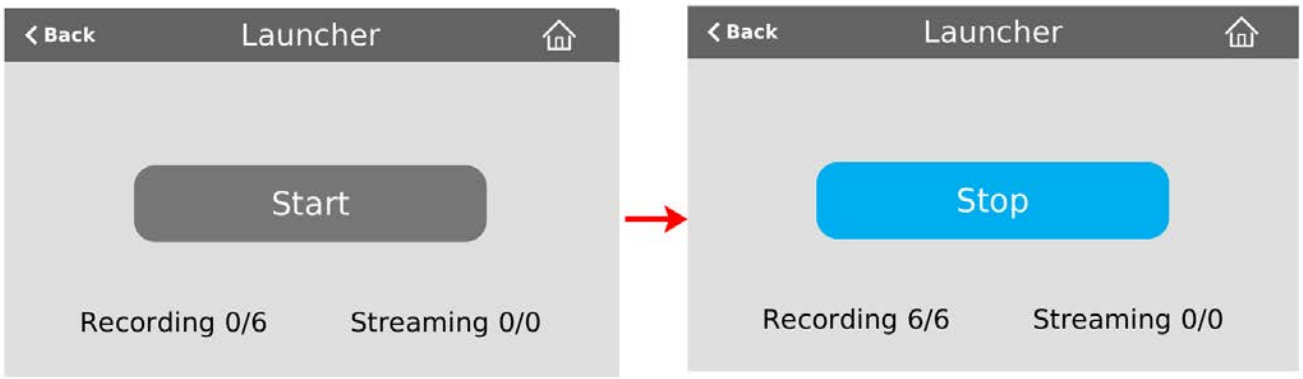
Pearl-2's One Touch recording and streaming control allows you to control your recording and streaming across any number of channels and recorders with a single tap on the touch screen. Channels and recorders are enabled for One Touch recording by default. For more information, see One Touch streaming 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 considerations

- The file recording type for a channel you are controlling and recording using AV Studio must be set to MP4 and the maximum file size supported is 500 MB.

The following table describes the recordings configuration settings.

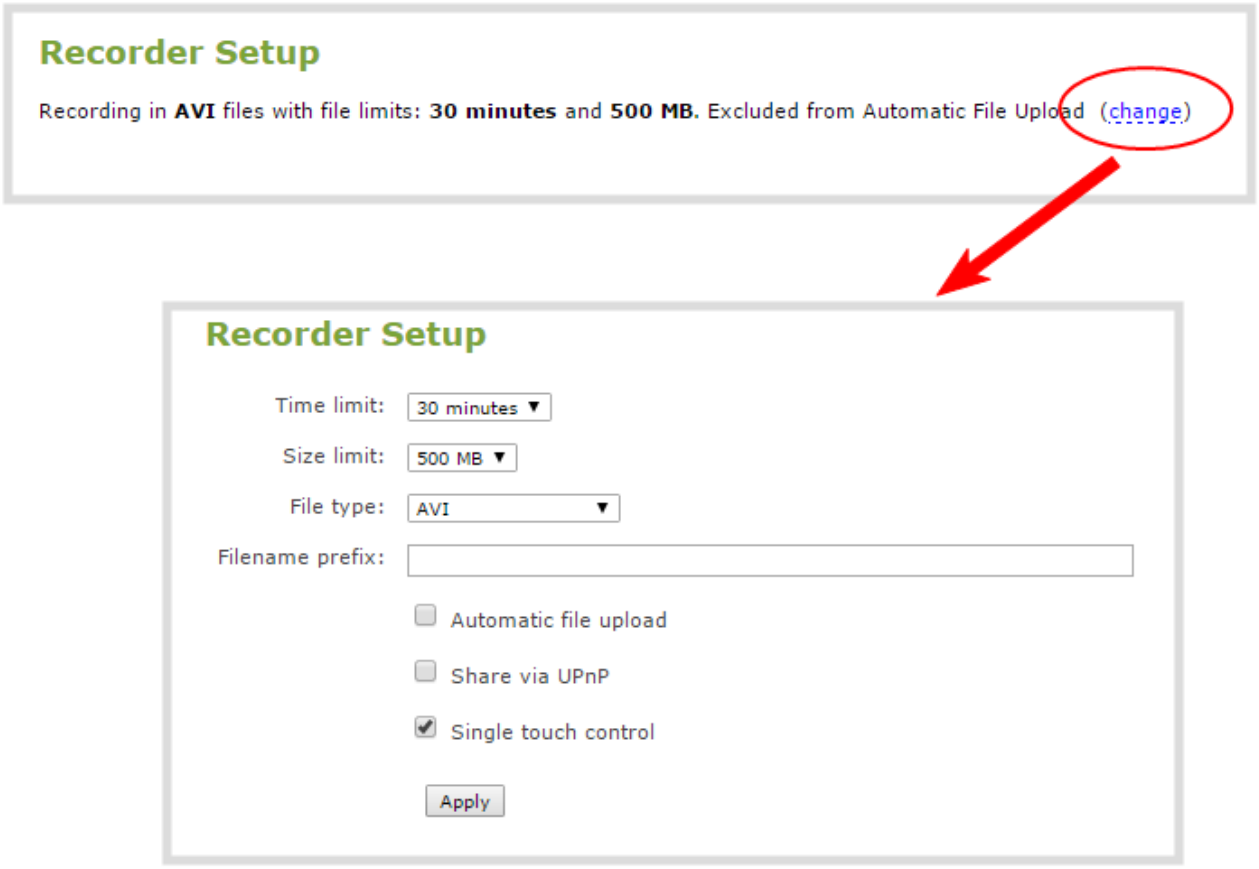
Table 57 *Recordings Configuration Settings*

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 range from 50 MB to 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. • **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.

Label	Description / Options
	• **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 64 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:

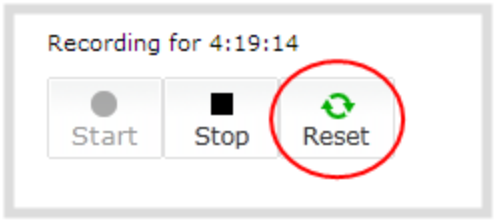
- The recording reaches the configured time or size limit.
- The channel or recorder name is changed.
- Changes are made to the stream.

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-2, 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-2 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:

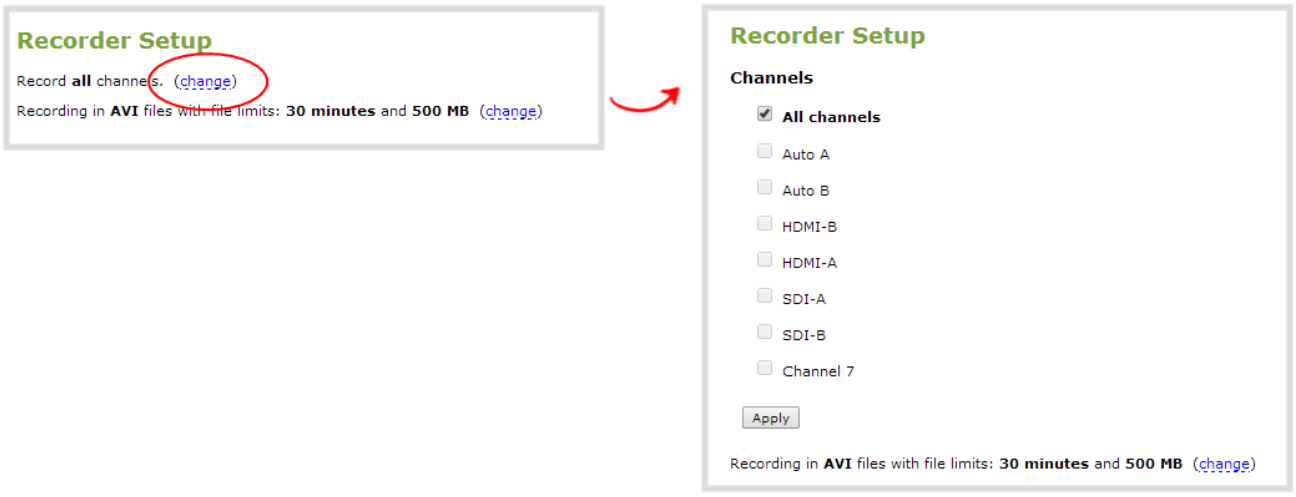
1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. From the Recorders menu, click **Add recorder**.

Select channels to record

When you create a new recorder, it records all the channels configured on Pearl-2 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**.

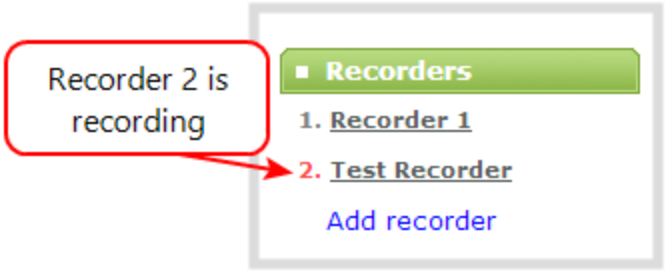
Channels with no active video source are displayed in italics. You can include these channels in your channel selections for the recorder.

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.

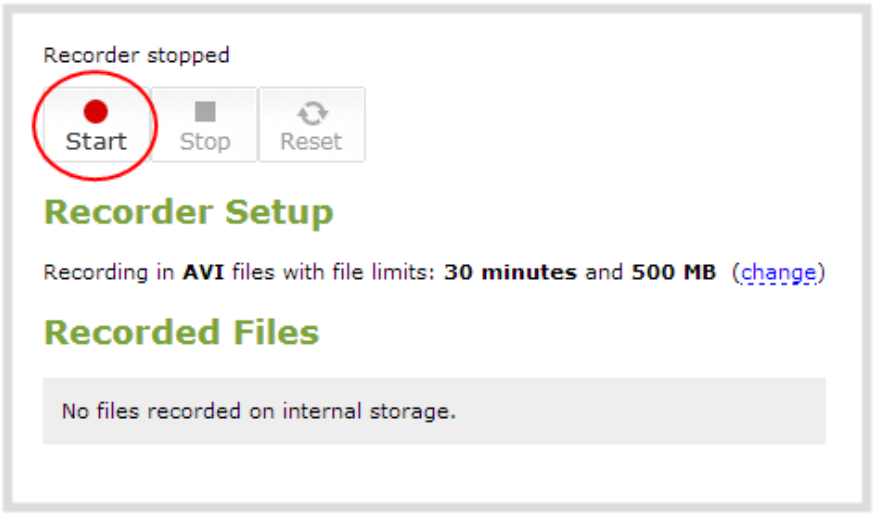


You can have multiple recorders and multiple channels recording all at the same time. The number of channels being recorded is shown below the Start and Stop buttons on the recorder's configuration page. To select which channels to include in the recorder, see Select channels to record.

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.

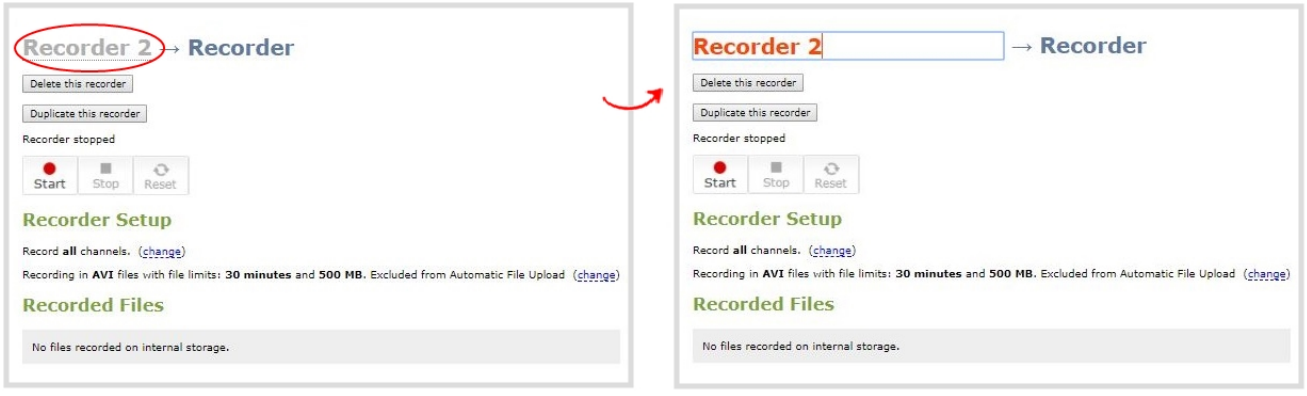


You can navigate away from the page without affecting the recording.

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

Your recordings are stored on the system's internal hard drive. Although there's a lot of space on the hard drive, it's good practice to remove old recordings to free up space before the drive if full. If there's no more free space for new recordings, new recordings will overwrite the oldest recordings on the hard drive.

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

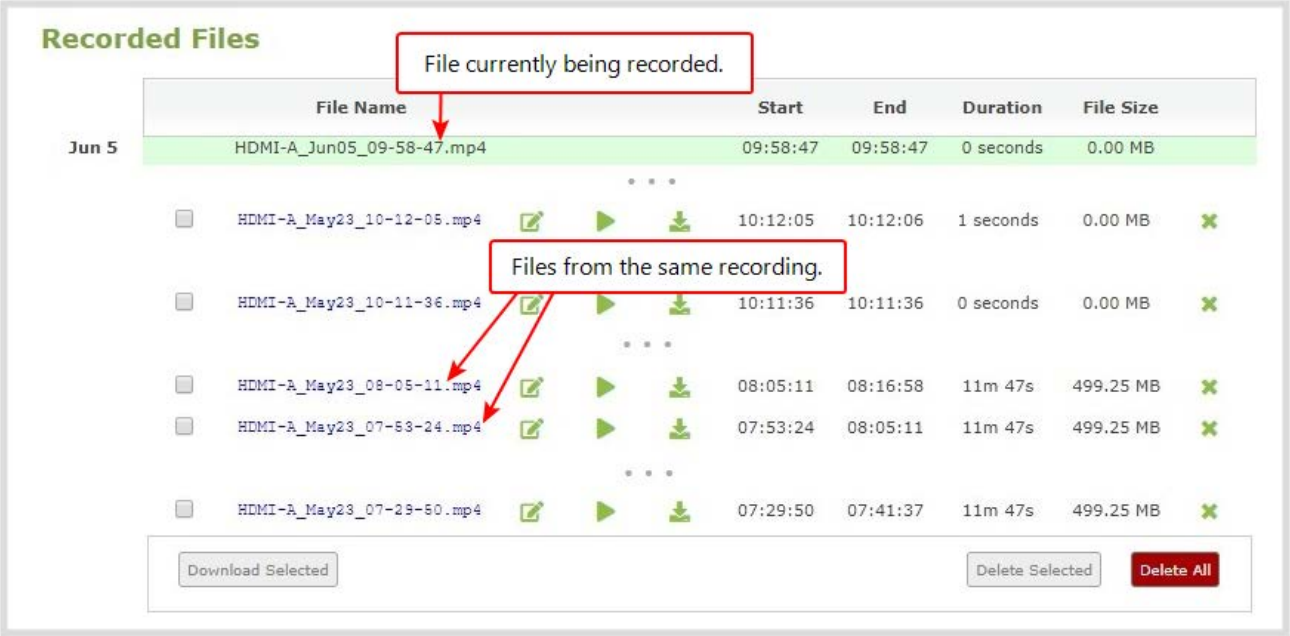
For information about automatic file transfers, see File and recording transfer.

View list of recorded files

Recordings for Pearl-2 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.

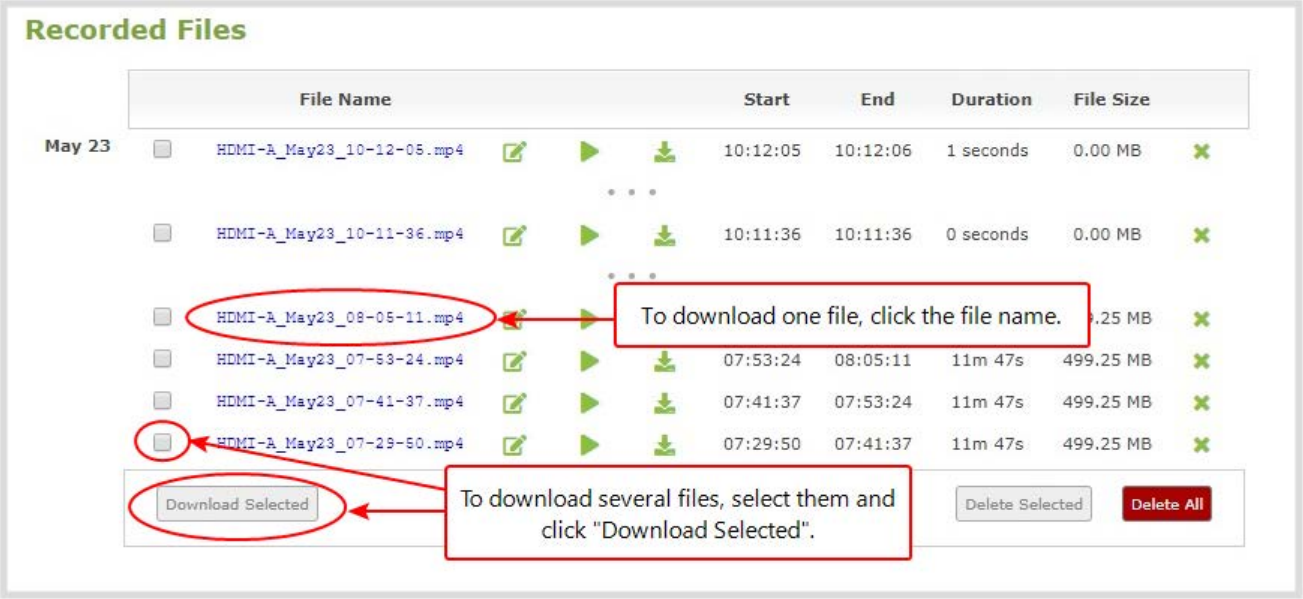
Download recorded files manually

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-2, 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-2, 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-2 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.

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

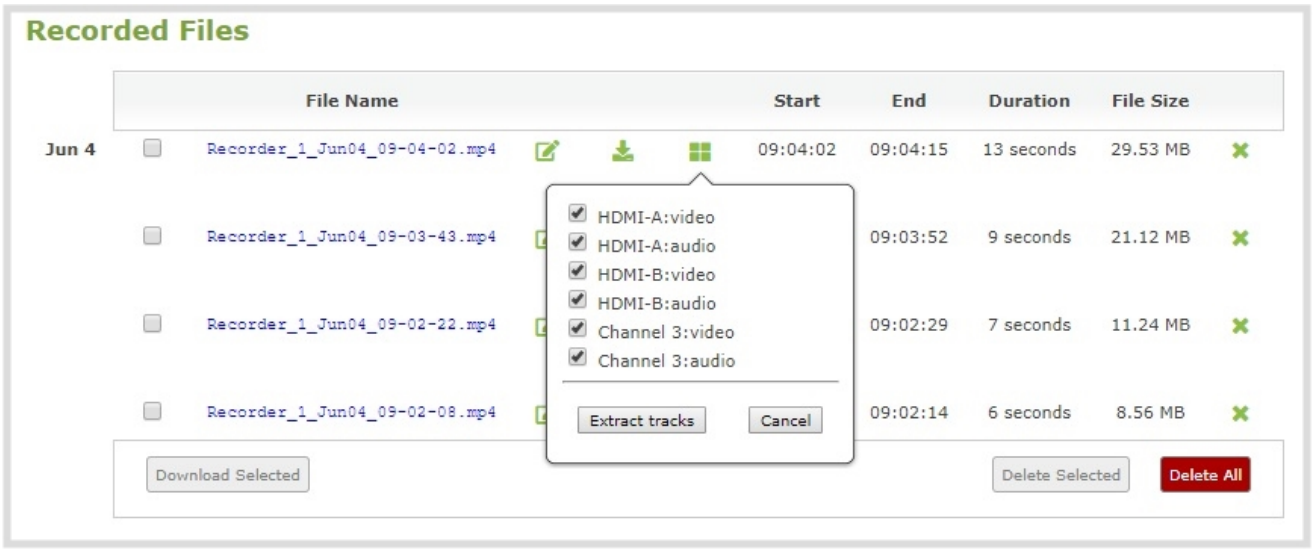
Recorders combine multiple channels and audio sources together in a single multi-track file. You can create a copy of a recording using only select tracks. This feature is supported for .AVI, .MP4 and .MOV recordings only. MPEG-TS does not support track extraction.

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 internal storage space is available on Pearl-2, see Storage space maintenance.

To create a duplicate recording file with only select tracks:

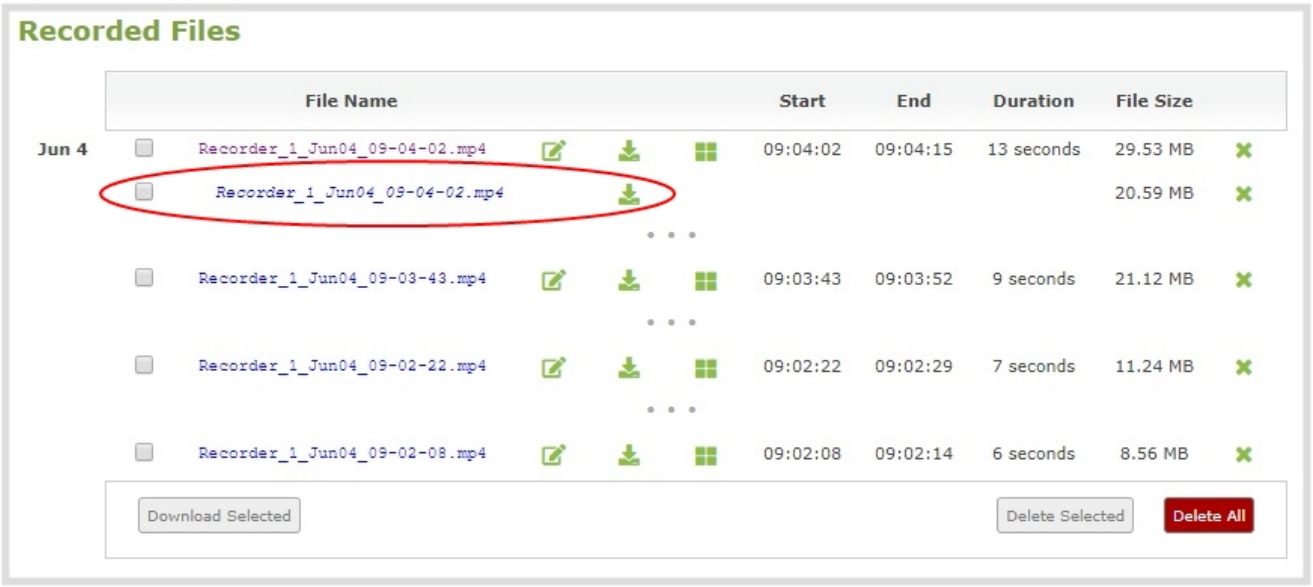
1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.
2. From the Recorders menu, select a recorder. The recorder page appears.
3. Click the multi-track icon beside the recording. A list of tracks appears.



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-2 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.

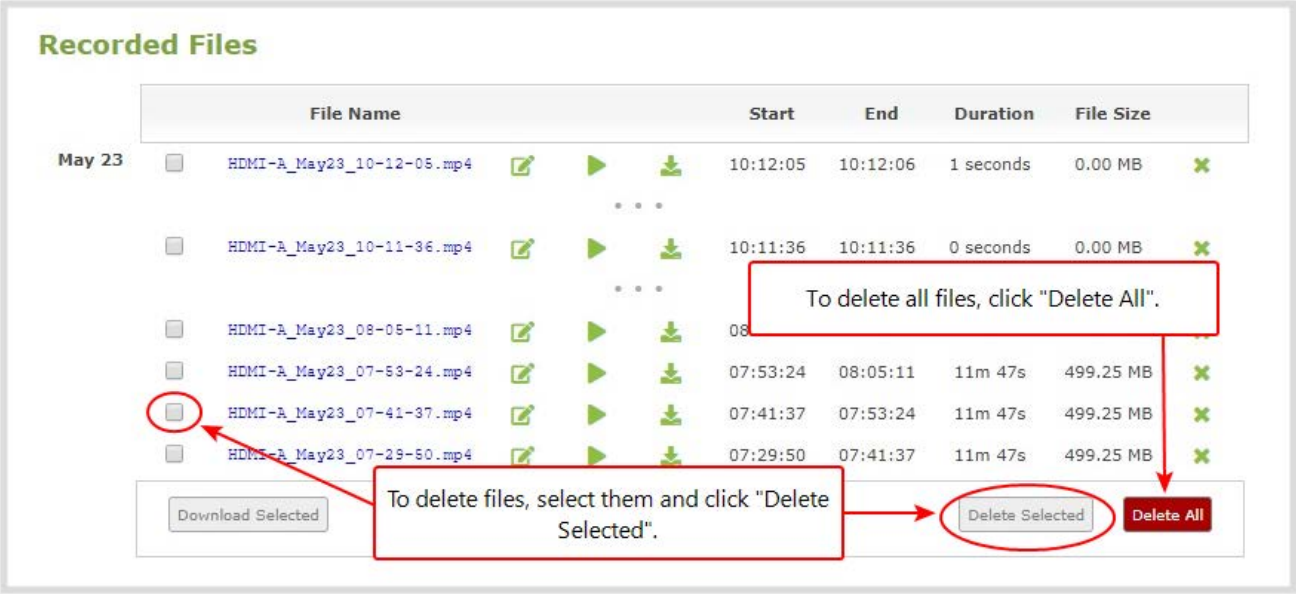
Delete recorded files

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.

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.



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-2 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-2's touch screen)
- Manage the AFU queue

About Automatic File Upload (AFU)

Pearl-2 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.

Do not configure AFU for a channel that is paired with AV Studio.

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-2 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.

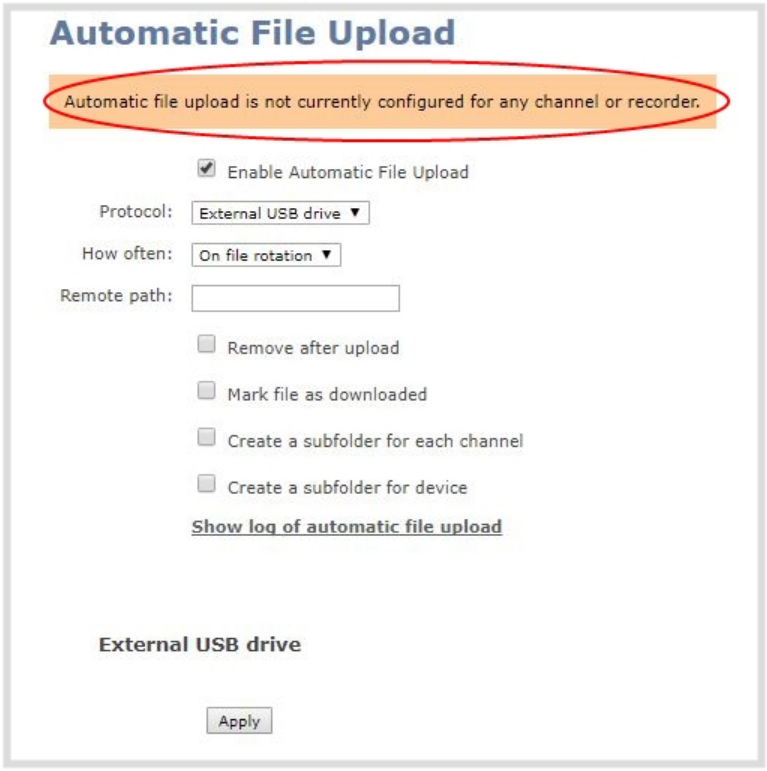
If the connection is lost during the transfer, the transfer automatically restarts when the connection is reestablished.

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.

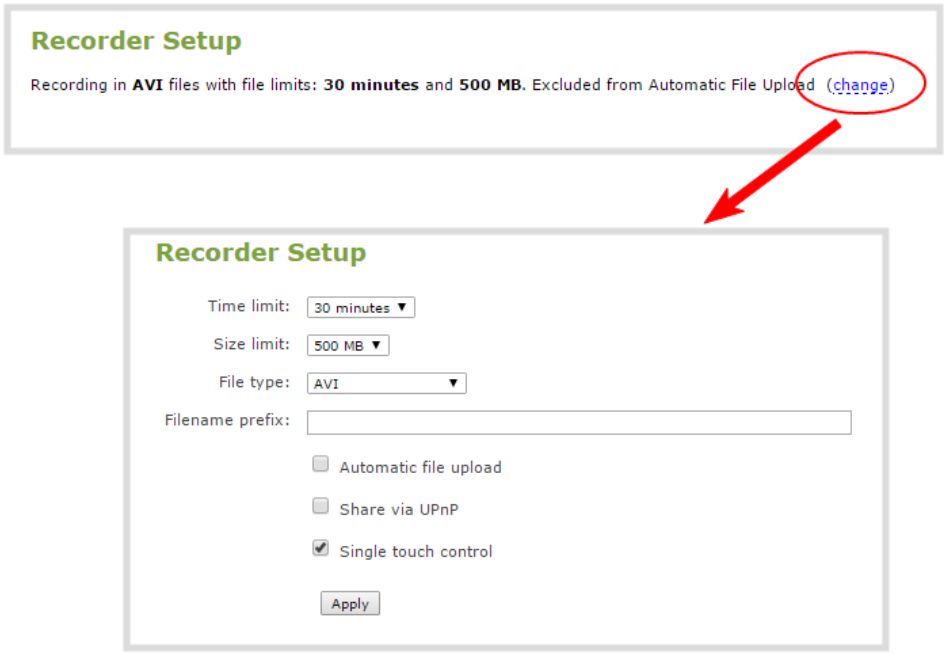
If no channels or recorders are configured as a part of AFU, the following message appears in the Automatic File Upload configuration page.



Do not configure AFU for a channel that is paired with AV Studio.

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**.

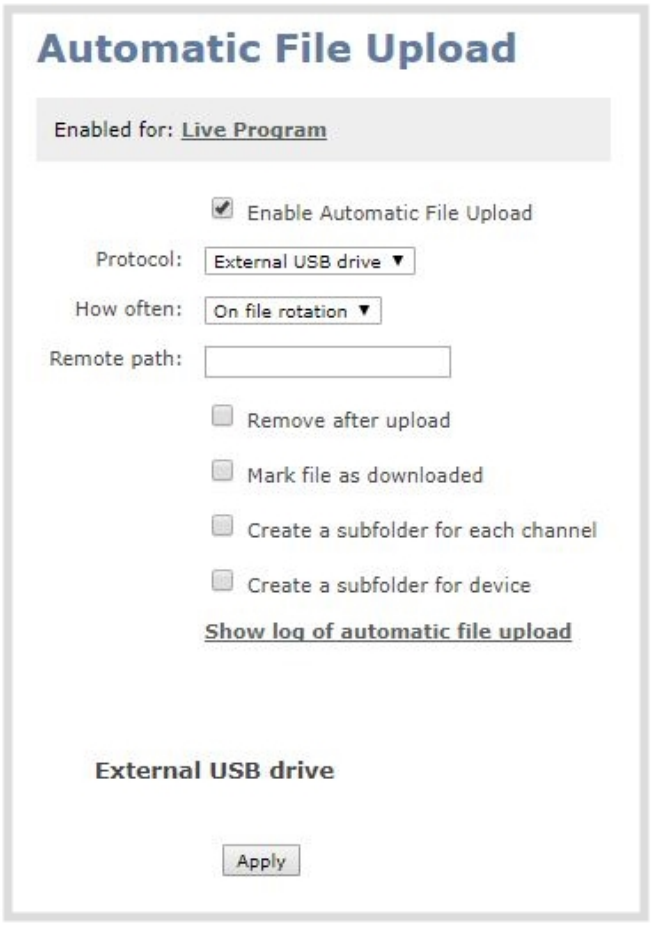
The following table describes the available AFU options.

Table 58 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.



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-2 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-2.

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 59 *FTP Automatic Upload Configuration Parameters*

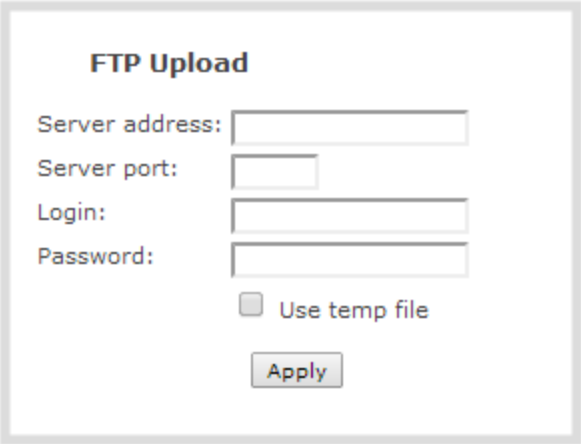
Name	Description
Server address	The IP address (or fully qualified domain name) of the FTP server.
Server port	The port used by the target FTP server. Standard port is 21.
Login	User name for the FTP server.
Password	Password for the FTP user.
Use temp file	Causes files to be named with .part extension 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 60 RSync Automatic File Upload Configuration Parameters

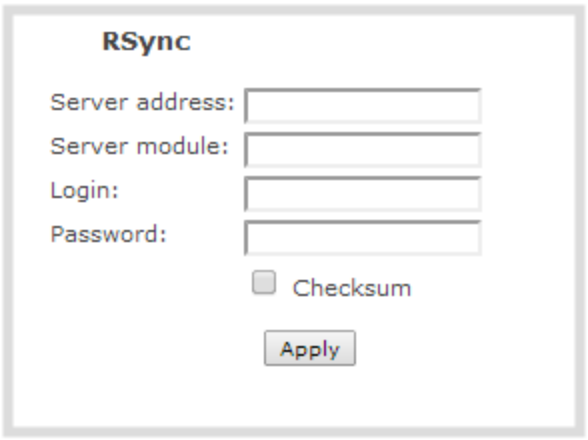
Name	Description
Server address	The IP address (or fully qualified domain name) of the RSync server.
Server module	The name of the shared folder on the RSync server.
Login	Username for the RSync server.
Password	Password for the RSync user.
Checksum	Select to enable checksum checking during file transfer. 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 61 *CIFS Automatic File Upload Configuration Parameters*

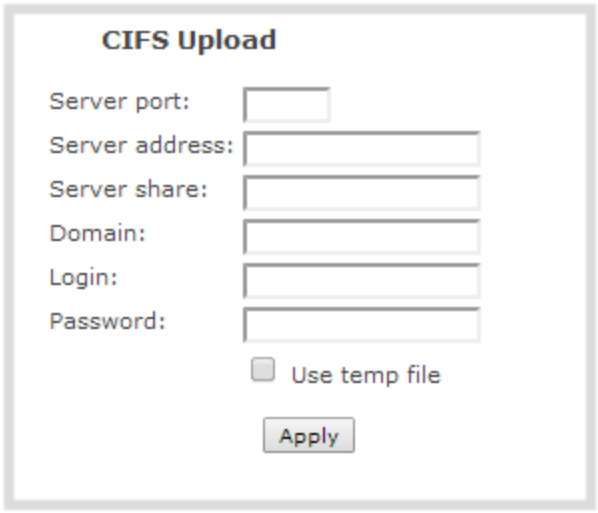
Name	Description
Server Port	The CIFS server port. Leave blank to use the default port, or enter the port used for your CIFS server.
Server address	The IP address (or fully qualified domain name) of the CIFS server.
Server share	The name of the shared folder on the CIFS server.
Domain	The CIFS server's 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 62 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.

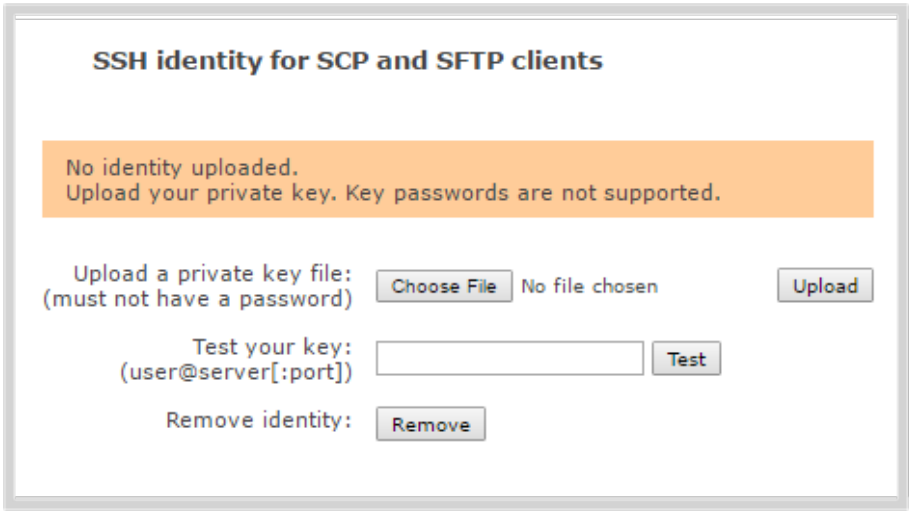
To configure upload to an SCP client:

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-2. 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 63 SFTP Automatic Upload Configuration Parameters

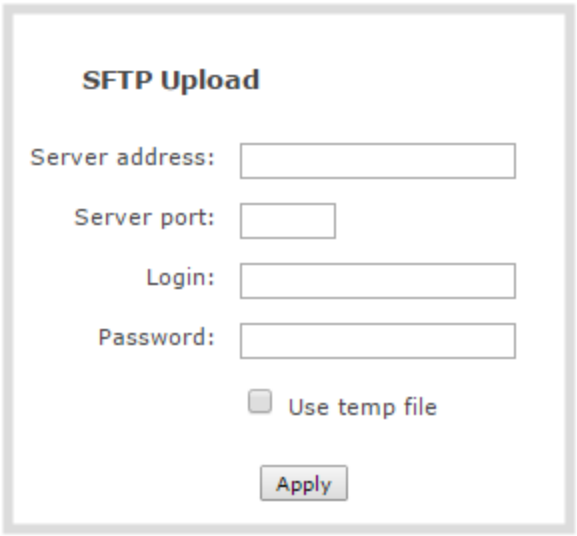
Name	Description
Server address	The IP address or fully qualified domain name of the SFTP server.
Server port	The port used by the target SFTP server. Standard port is 22.
Login	Username for the SFTP server.
Password	Password for the SFTP user.
Use temp file	Causes files to be named with .part extension 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.

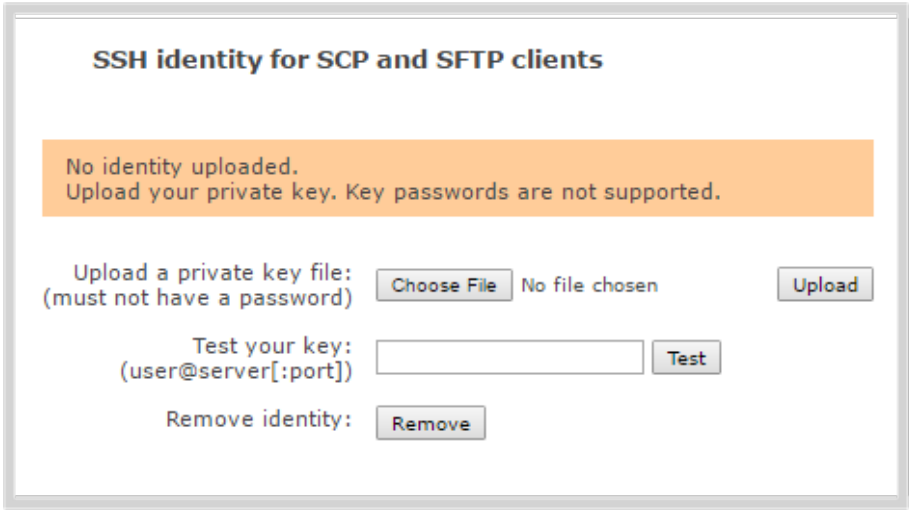


2. Specify the target **Server address**. If your system is configured with DHCP or has a valid DNS configuration (see Configure DHCP), you can use the server's fully qualified domain name instead of the IP address.
3. Specify the **Server Port** used for the target SFTP server. The standard port is 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-2. 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 64 *AWS Automatic Upload Configuration Parameters*

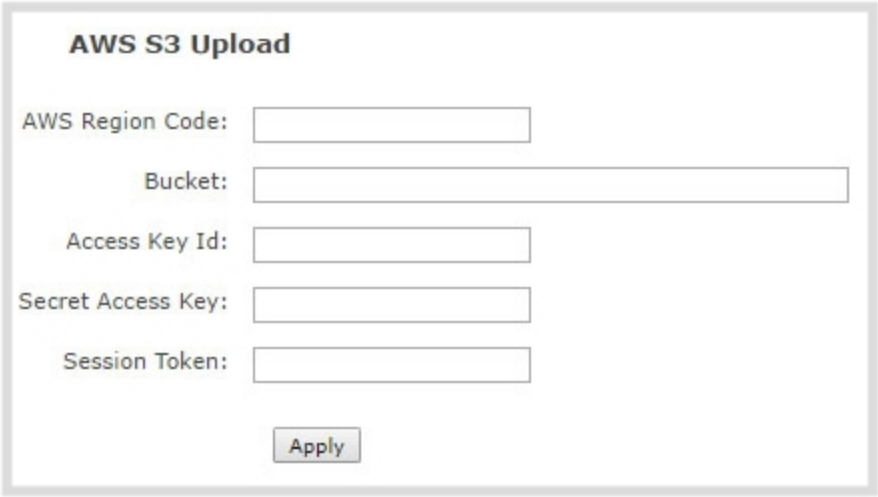
Name	Description
AWS Region Code	The geographical region of the AWS server that contains the bucket you want to upload to, e.g. us-east-2.
Bucket	The id of the data storage container you created in Amazon S3 for the recorded live streaming files.
Access Key Id	The Access Key Id is part of your access 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 65 *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.

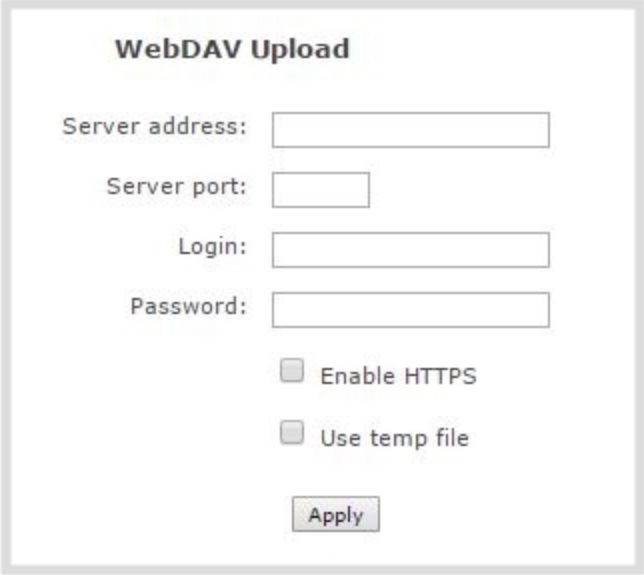
Name	Description / Options
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4 or .avi).

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-2 has USB 3.0 ports that you can use to copy recordings from internal storage 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

We recommend you only connect one USB device to Pearl-2 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-2.

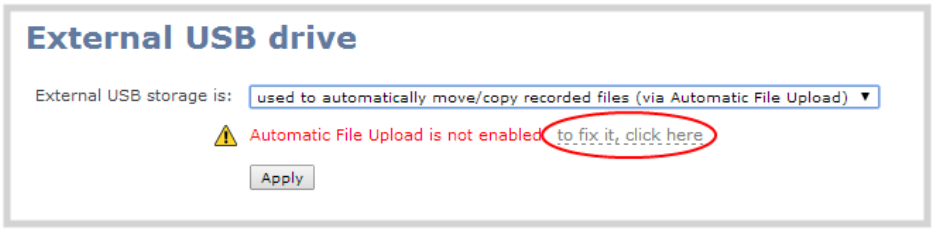
Prerequisites

- A properly formatted USB device must be connected to one of the USB ports.
- 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.

Table 66 *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****.*



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-2 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 67 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.

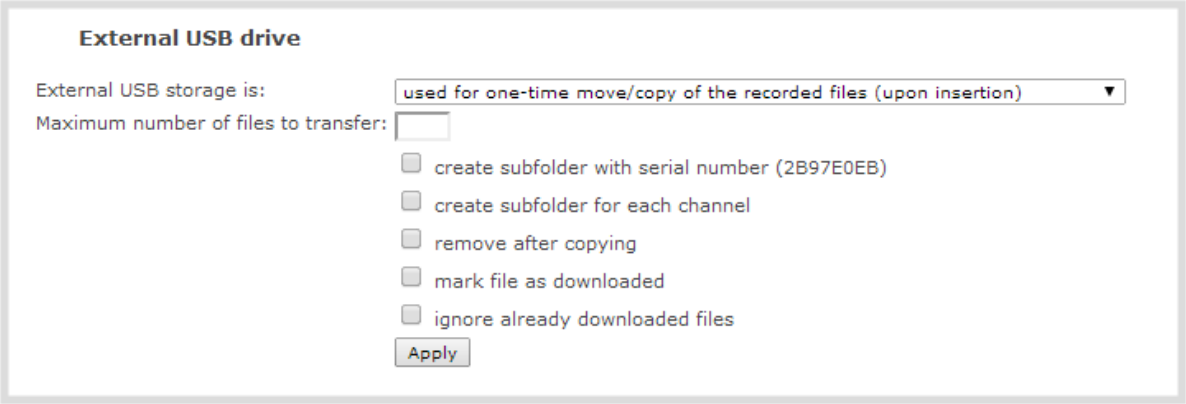
Prerequisites

- A properly formatted USB device not connected to a USB port on Pearl-2.

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.

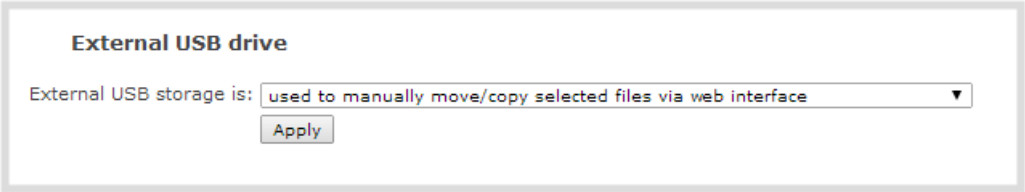
Manually copy recordings to USB storage device

You can manually copy recorder files to a USB drive connected to Pearl-2.

This procedure is separate from automatic file upload and does not need any pre-configuration in the automatic file upload page.

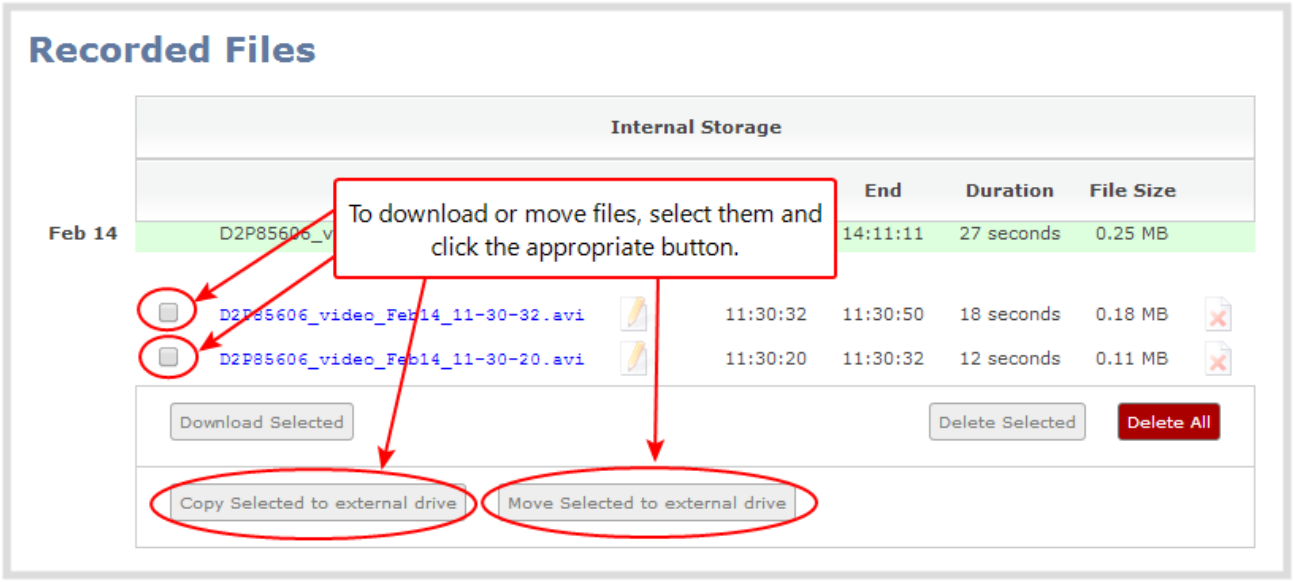
To manually copy recorded files to a USB device:

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-2 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-2.



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.

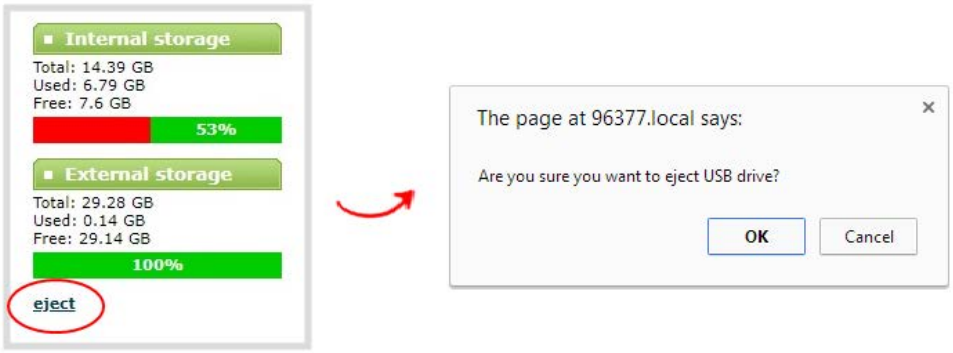
When you insert your USB storage device into an available USB port, an External storage usage information tab appears at the bottom of the menus panel.

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.



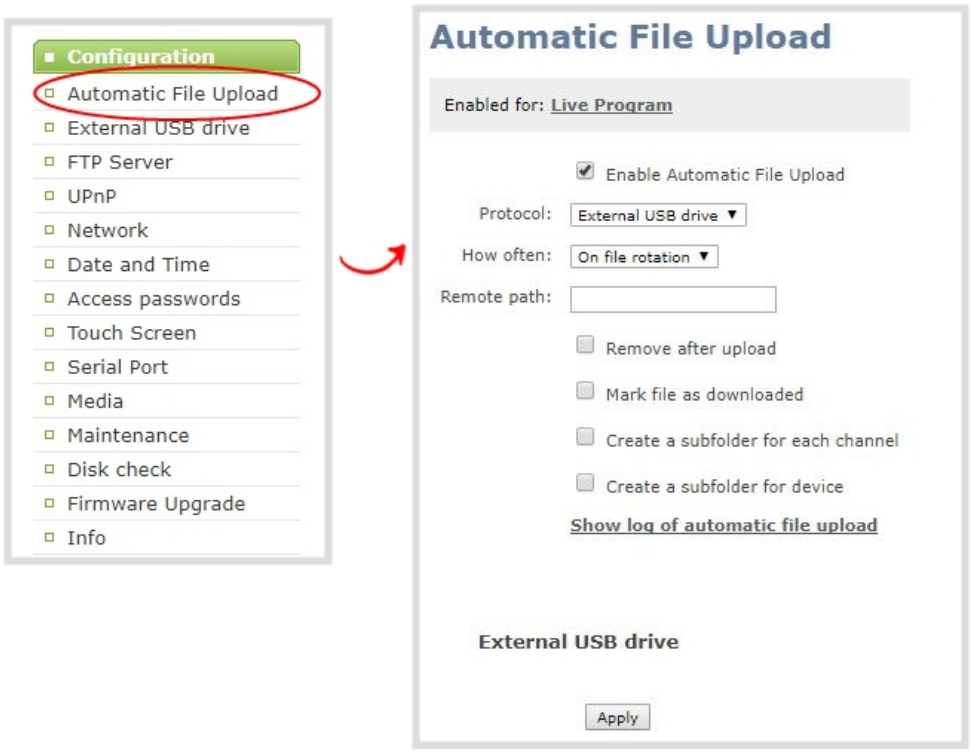
It's now safe to disconnect the USB storage device from Pearl-2.

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

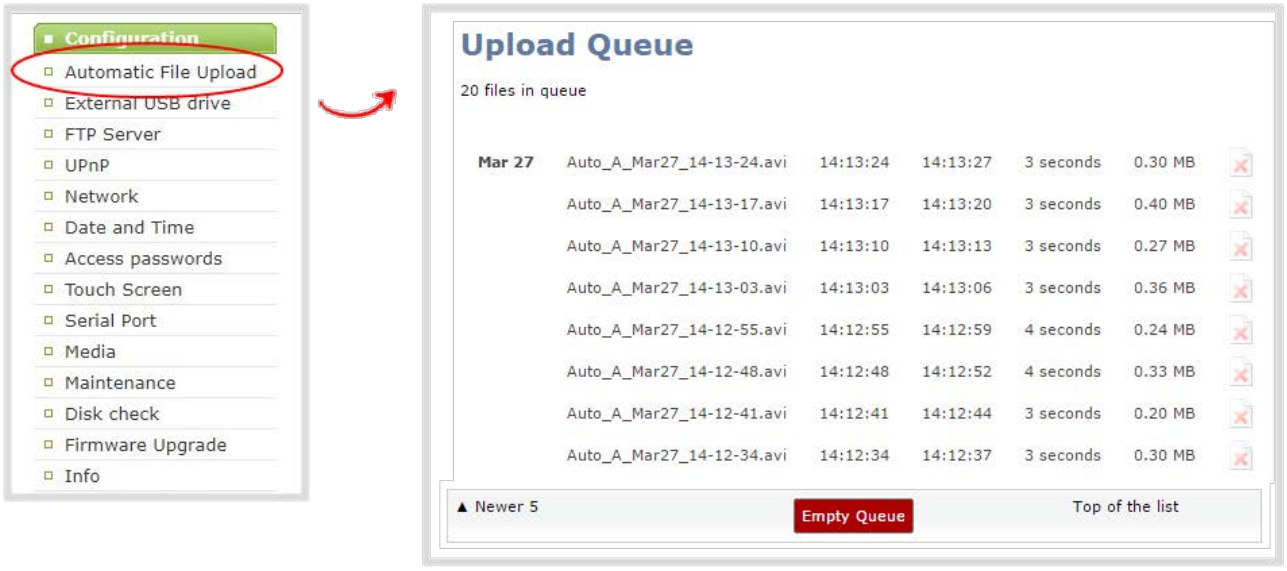
The AFU queue displays a list of recording files waiting to be uploaded. Individual file details can be viewed using the Admin panel.

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.

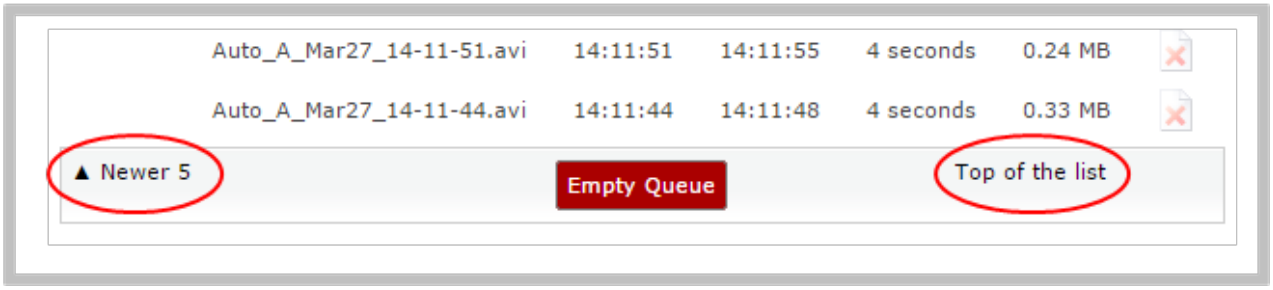


Change how the AFU queue displays

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.



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**.

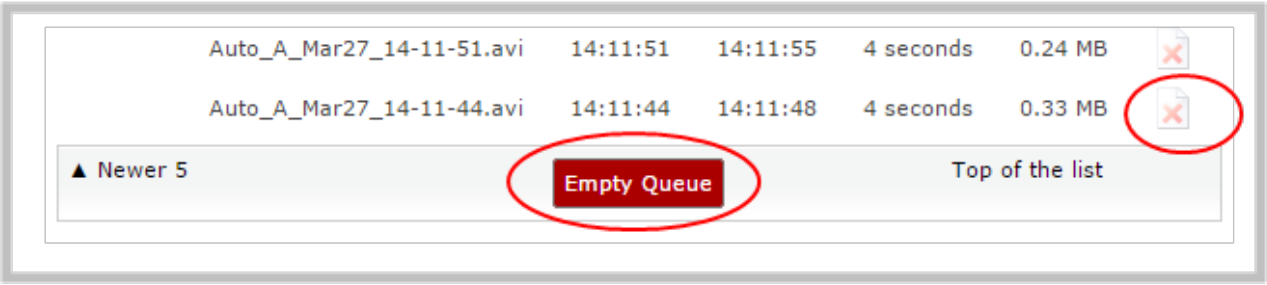
Delete content in the AFU queue

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.



Local FTP server

Pearl-2 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-2 using the Admin panel.

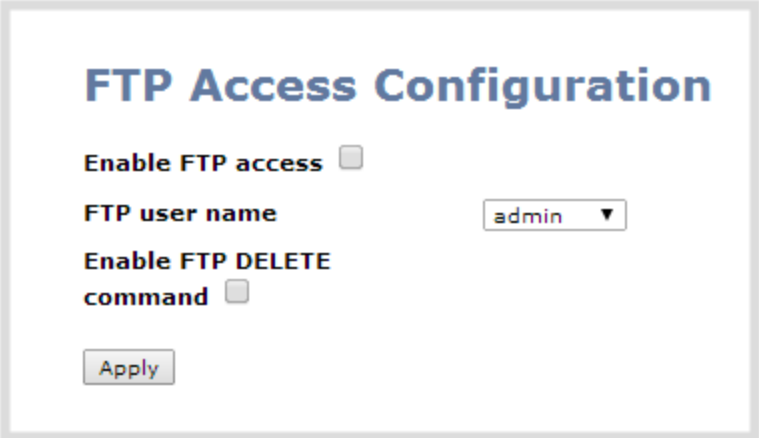
The following table describes the configuration parameters to setup Pearl-2's local FTP server.

Table 68 *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-2'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.



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-2.

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).

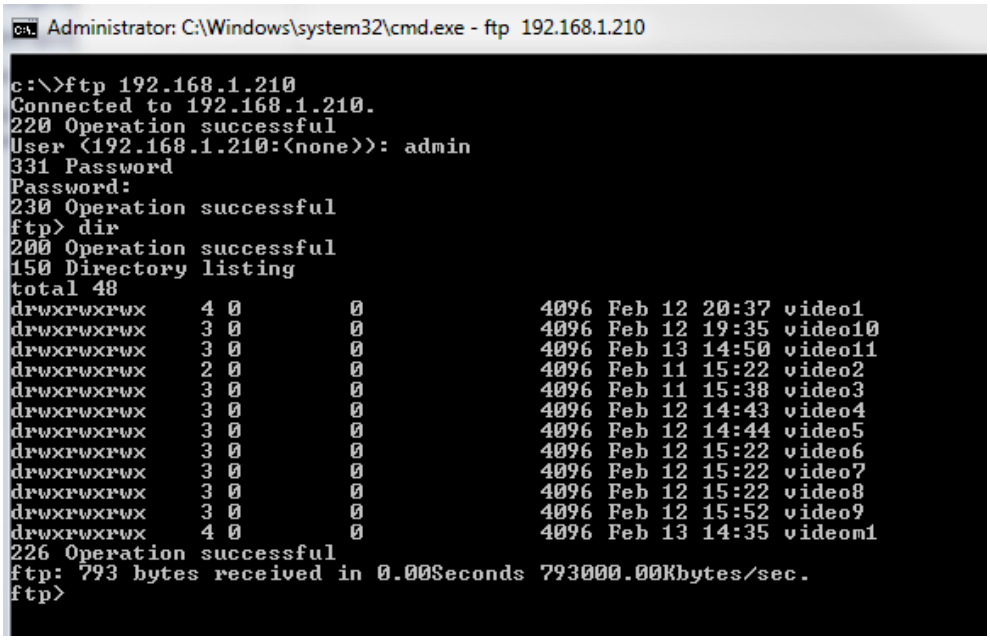
Prerequisites

- The IP address of your Pearl-2, see Verify IP address and MAC address of Pearl-2
- An FTP tool
- The username and password for your FTP user, see Configure the local FTP server

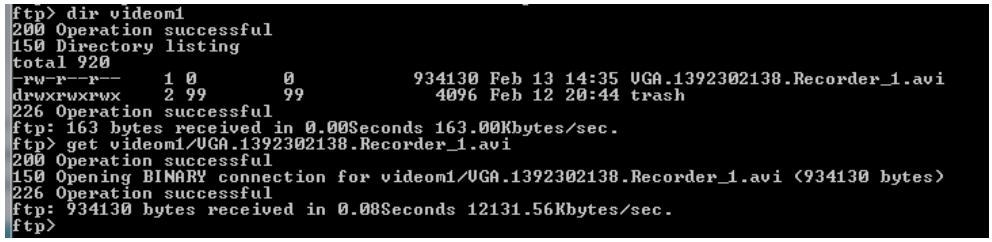
In the following example, the IP address of Pearl-2 is 192.168.1.210, the username is **admin**, there is no password, and the Windows command line ftp utility is used.

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.



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.



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-2 running smoothly and operating with the latest firmware. Learn the maintenance features of Epiphan Live and different ways you can configure and operate Pearl-2 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-2 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-2. The power button on Pearl-2 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-2 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-2 using the power button.

The power button for Pearl-2 is found on the front.

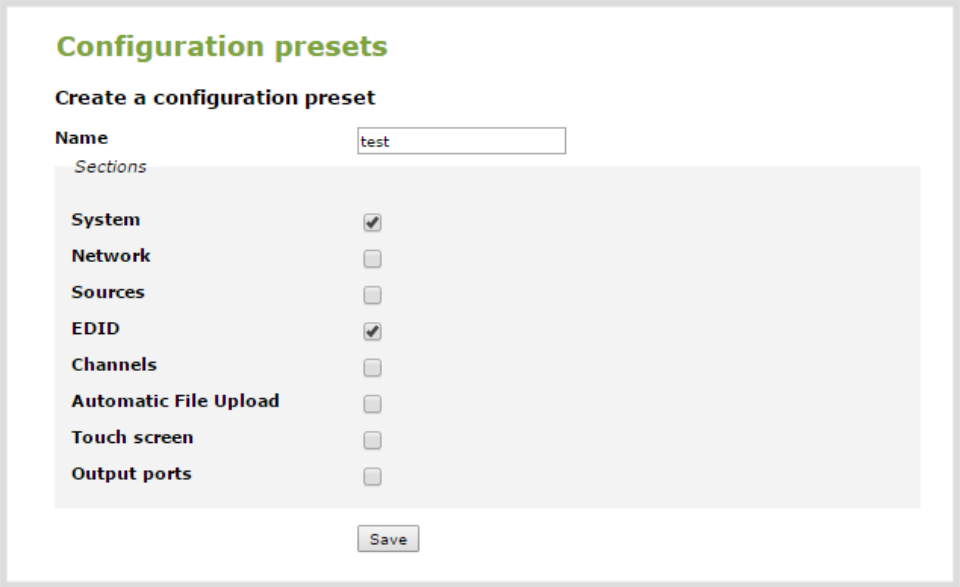
To power off Pearl-2 manually, double-press (two successive fast presses and releases) the power button to initiate a safe power down.

If the system is unresponsive, press and hold the power button for 4 seconds to force an immediate power down.

Backup your Pearl-2 setup

Configuration presets are the perfect way to backup your Pearl-2 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-2 to the manufacturer's original default settings.

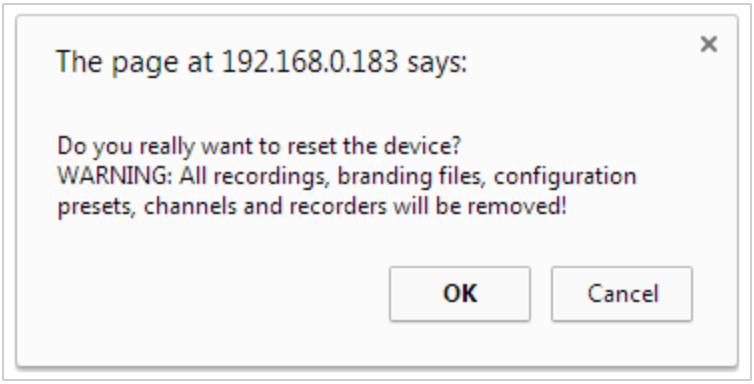
Performing a factory reset erases all your input port settings (video and audio), channels, configuration presets, network settings, all locally saved media files and recordings from Pearl-2.

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.

3. Click the **Reset** and click **OK** when prompted.



4. The system resets to factory defaults and reboots. Wait for the system to finish rebooting before configuring Pearl-2.

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-2, install new firmware whenever the system indicates that a firmware update is available.

Topics include:

- Check for firmware updates
- Update the firmware

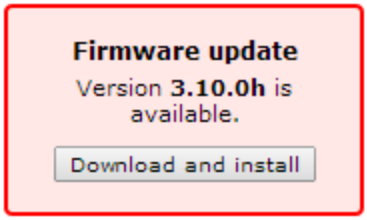
Check for firmware updates

Your Pearl-2 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-2 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.



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. You should also clear your web browser's cache after the update is complete.

If your Pearl-2 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-2 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.

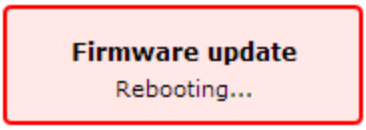
To perform a firmware update:

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-2 is going to reboot. Wait for the system to restart.



6. After the system reinitializes, go to the settings for your web browser and clear your web browser's cache.
7. Connect to the Admin panel and login as **admin**, see Connect to the Admin panel.
8. 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-2, the previous firmware version (if known), and the new firmware version and contact **info@epiphan.com**

Support

Your Pearl-2 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-2 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".

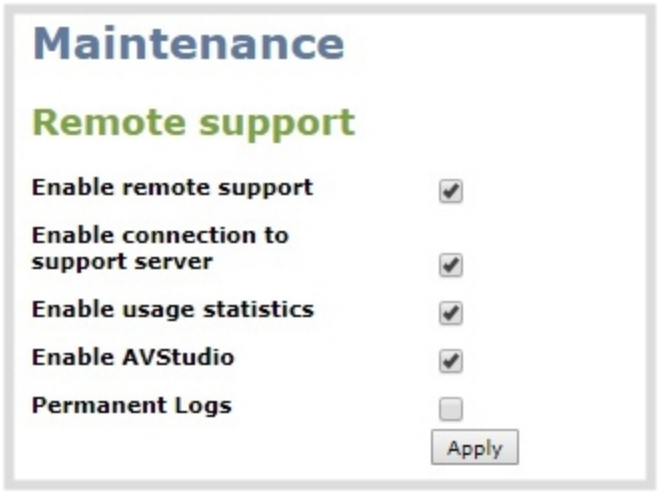
Remote support is only provided for systems covered by SupportPlan+.

Download logs and allinfo file

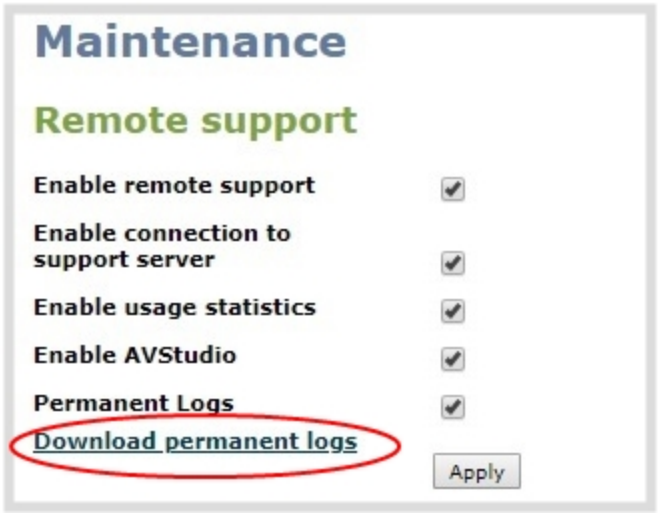
If requested by Epiphan support, you can download the logs files and/or "allinfo" data from your system. These files help our support team troubleshoot problems.

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-2 to help you troubleshoot issues and reset lost admin passwords.

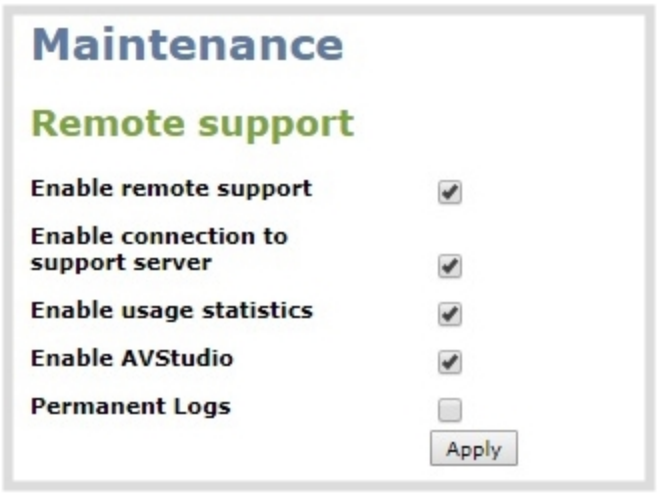
Your network must allow access to the Epiphan maintenance server, which has the domain name epiphany.epiphan.com. Pearl-2 must be able to resolve this domain name to connect to the Epiphan maintenance server for remote support.

Remote support uses ports 22 and 30. Ensure that these ports are opened to allow remote communication. If your Pearl-2 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.



3. Check **Enable remote support** to enable incoming connections from Epiphan Systems.
4. Check **Enable connection to maintenance server** to enable outgoing links to the Epiphan maintenance server epiphany.epiphan.com.
5. Click **Apply**.

6. Test that Pearl-2 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.
7. If Pearl-2 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.
8. If Pearl-2 reaches the maintenance server, ensure your firewall has port 30 open.
9. Confirm with Epiphan support that they are able to access your Pearl-2 for remote troubleshooting.

Disable remote support

Remote support is enabled by default. You can turn remote support off for your Pearl-2 using the Admin panel.

Disabling remote support removes the ability for Epiphan to reset a lost admin password on your Pearl-2. 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-2:

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 Systems.
4. Uncheck **Enable connection to maintenance server** to disable outgoing links to the Epiphan maintenance server epiphany.epiphan.com.
5. Click **Apply**.

Storage space maintenance

Pearl-2 has a solid-state storage drive for storage of recordings. Occasionally, some maintenance is required.

Topics include:

- Check internal storage space
- Schedule disk check
- Perform disk check

Check internal storage space

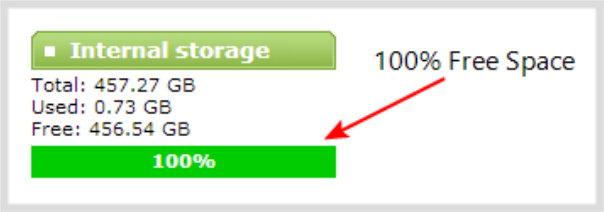
You can check how much internal storage space is available on Pearl-2 using Using the Admin panel and from the touch screen.Pearl-2 has a 512 GB SSD.

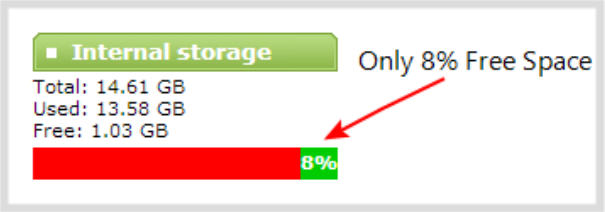
It's good practice to monitor how much free space is available. If the amount of available storage is low, you can always remove some of the recorded files, see Manage recorded files and File and recording transfer.

Disk space can also be checked using Epiphan Live, see **Configure Dashboard panels**.

To check internal storage space:

1. Login to the Admin panel as **admin** or **operator**, see Connect to the Admin panel.
2. 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.





Schedule disk check

A disk maintenance schedule is used to check the system storage drives for errors. Two values are supplied, one to specify the number of system restarts that should occur before disk check, and the second to specify the number of months before performing a disk check. The disk check happens based on whichever event occurs first.

For example, let's say the restart setting is set to 50 and the months setting is set to 6. If six months pass and less than 50 restarts happened, a disk check will occur on the next restart. However if you do 50 restarts in one month, the disk check will happen after the fiftieth restart.

Disk check occurs during start up and can cause a lengthy delay in starting up the system.

To set the disk check schedule:

1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. Select the **Disk Check** link in the Configuration menu; the disk maintenance page opens.
3. Set the **number of restarts to occur before the next check**. Set to 0 if you don't want to force a disk check after a specific number of restarts.
4. Set the **number of months to pass before the next check**. Set to 0 if you don't want to force a disk check after a specific number of months.
5. Click **Save**.

Perform disk check

A disk maintenance schedule is used to periodically check the system storage drives for errors. If you prefer, you can run the disk check manually at a time that is convenient for you.

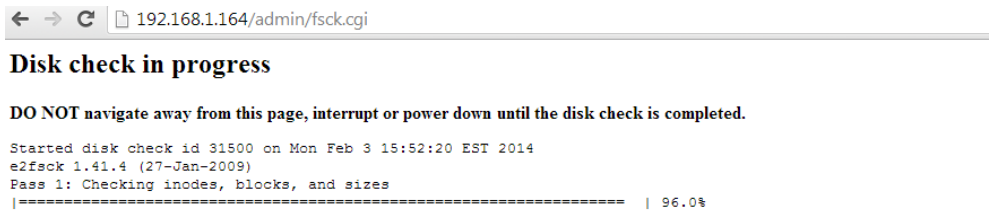
Running the disk check manually resets the timers for the scheduled disk check (i.e. next check won't happen automatically until either the number of restarts or months passes).

If the system is recording when you start a disk check, it will stop recording and resume after the check is complete. Frames presented during the disk check are not part of any recording.

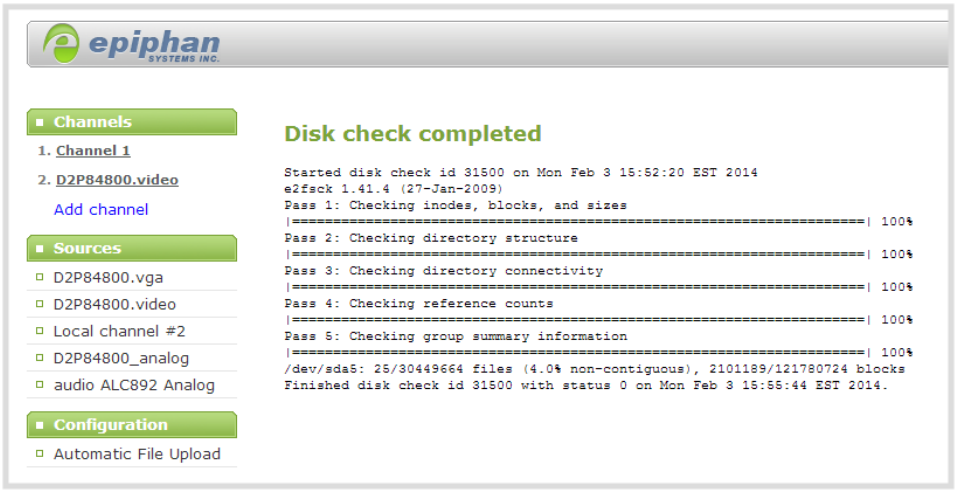
To start a manual disk check:

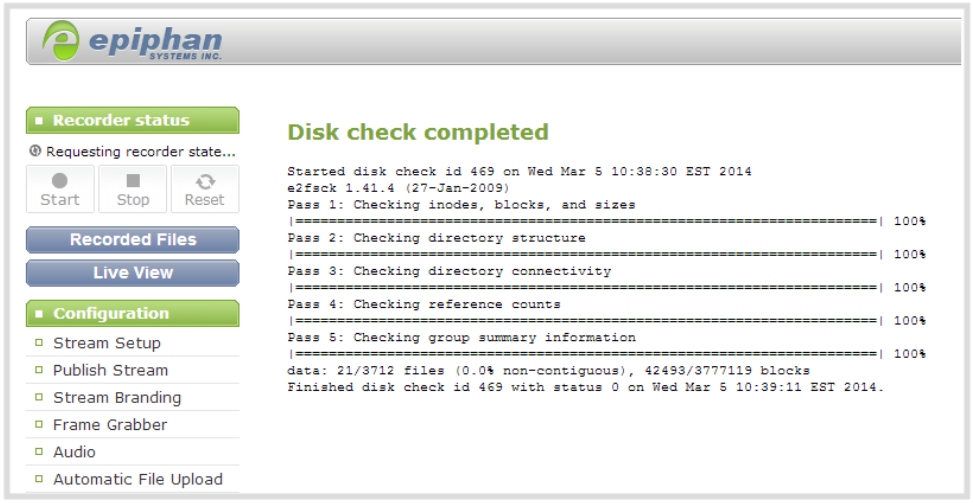
1. Login to the Admin panel as **admin**, see Connect to the Admin panel.
2. Select the **Disk Check** link in the Configuration menu; the disk maintenance page opens.
3. Click the **Check Now** button; a new page opens showing you the progress of the disk check.

Do not interrupt power to the system during the disk check.



4. When the disk check is complete, the main page returns and a summary is shown.





Third party integration

Pearl-2 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-2 using RS-232 / serial port
- Controlling Pearl-2 using HTTP commands
- Configuration keys for third party APIs

Controlling Pearl-2 using RS-232 / serial port

Pearl-2 has an RS-232 / serial port control interface for integration with existing control room and board room equipment.

Important considerations

- Each command sent to Pearl-2 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-2, see Connect and configure the RS-232 port

The following examples show how to use RS-232 commands to control Pearl-2:

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-2, you need a standard RS-232 cable.

To connect the serial port cable:

1. Attach the RS-232 cable to the control interface.
2. Connect the RS-232 cable to the back of the system.

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 69 *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 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.

Label	Description / Options
None	No flow control is used. Only select this if your control terminal doesn't use a handshake.

4. Click **Apply**.

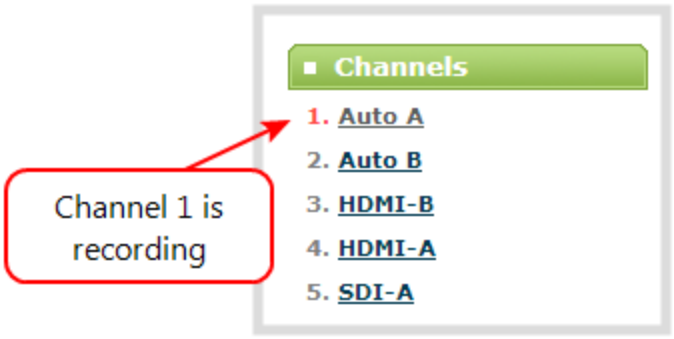
Control Pearl-2 with RS-232

You can use the null-modem cable and your control terminal software to issue commands to Pearl-2, such as when to start or stop recording, and to retrieve or set the value of certain parameters.

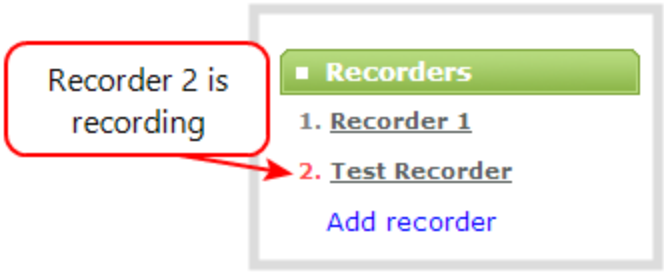
Each command sent to Pearl-2 over RS 232 must be terminated with a line feed (LF) character (ASCII code 10). Make sure that your software adds the line feed to each command.

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 70 *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 of all channels (supported only for channels configured to use the Motion JPEG codec). Snapshots are saved with recording files on the

Command Name	Description
	system.
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-2 returns a status change message whenever changes are made.

Table 71 *RS-232 Status Changed Messages*

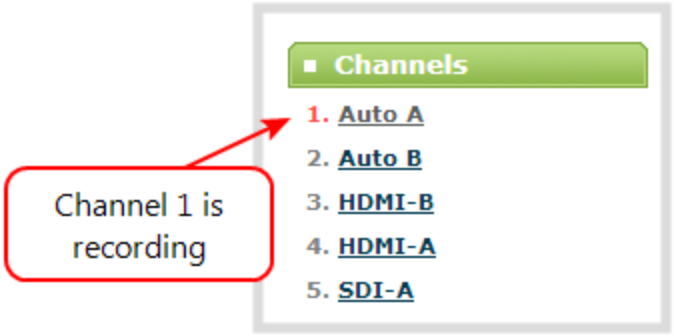
Command Name	Description
STATUS.<channel> <status>	Provides the status of the recording service for the channel as either: • Running

Command Name	Description
	• Stopped • Uninitialized The Uninitialized status is sent when there is an internal error. Check the system for more details.

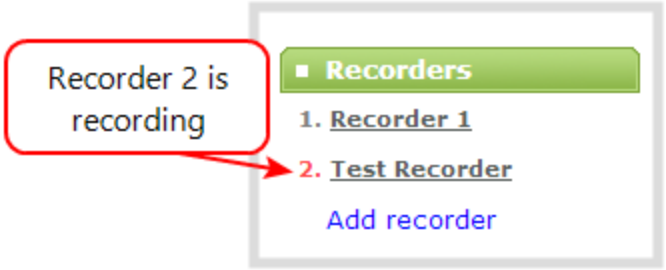
Controlling Pearl-2 using HTTP commands

Pearl-2 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-2, 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-2, always include the admin username and password when viewing or setting configuration items.

Specify your Pearl-2'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-2, 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-2 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-2 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-2.
- System variables are considered volatile data and are erased when Pearl-2 reboots.

Set variables – syntax and example

A set command saves a value to a variable, where <*address*> is the IP address of Pearl-2, *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-2:

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-2. For the RS-232 and HTTP syntax, see Controlling Pearl-2 using RS-232 / serial port and Controlling Pearl-2 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
- RTSP Announce configuration keys (Publish type 2)
- 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-2 when you browse to the following URL, where <*address*> is the IP address of Pearl-2:

```
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 72 *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 73 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 74 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-2 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 75 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 76 *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-2.

Table 77 *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-2 only, not for individual channels. See Restrict viewers by IP address for more information about Allow and Deny lists.

Table 78 *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 79 *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 80 *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 encoding.

Table 81 *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-2

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.

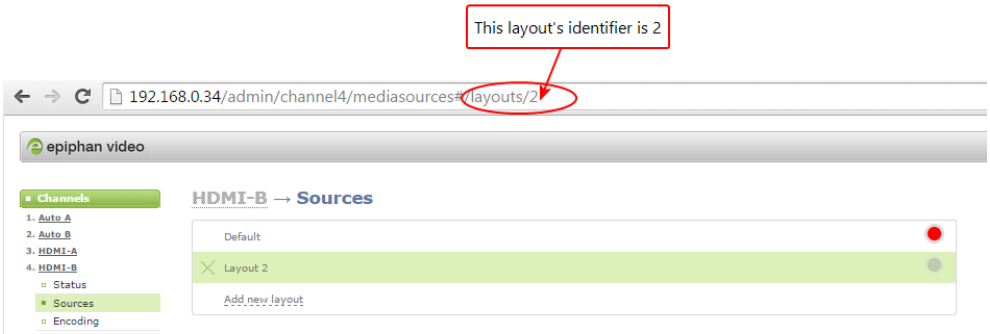


Table 82 Supported channel layout configuration keys

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 83 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 84 *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.

RTSP Announce configuration keys (Publish type 2)

The following settings are supported when the publish type is set to RTSP Announce. For more information on RTSP and these settings, seeSet up a stream using RTSP announceWhat is streaming?.

Table 85 *Supported RTSP Announce configuration keys*

Key	Values	Description
rtsp_url	string	Specifies the RTSP server announce URL.
rtsp_transport	tcp udp or empty string ("")	Specifies the RTSP transport, either tcp or udp.

Key	Values	Description
		Use udp or "" for udp transport Use tcp for tcp transport.
rtsp_username	string	Specifies the username for the RTSP server.
rtsp_password	string	Specifies the password for the RTSP server.

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 86 *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.
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 87 *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.

Key	Values	Description
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 88 *Supported RTMP Push Configuration Keys*

Key	Values	Description
rtmp_url	string	Specifies the RTMP server URL.
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 89 *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 90 *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 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-2.

Table 91 *Troubleshooting Quick Reference*

Problem	Action(s) to Resolve
4K features not working	The most likely problem is that the 4K Feature add-on is not activated. You can lean more about activating this feature here: 4K
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 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-2 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	The Flash (FLV) plugin must be installed for your web browser to play back audio that's encoded as PCM. Web browsers that use Flash players to preview video do not

Problem	Action(s) to Resolve
play audio.	support audio that's encoded using 48 kHz MP3 or 48 kHz PCM.
Timestamps between Pearl-2 and an RTSP source are not synchronized.	Reconnect your RTSP source to reset desynchronized timestamps. Verify that you are using a local NTP server on your Pearl-2 as a time synchronization server for your RTSP source, see Configure a time server.
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. 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-2.	Check if the selected recording format in Pearl-2 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	Some versions of Chrome and Microsoft Edge don't display channel previews from the Dashboard if you're on an HTTPs network and your website has an insecure or invalid security certificate, even after you update the security certificate. Use a different web browser such as Firefox or update the version of your web browser, then 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 encoding.
Frames per second are lower than	The following tips can help improve frames per second (fps):

Problem	Action(s) to Resolve
expected.	1. Increase **the Limit frame rate** value and/or decrease the **Bitrate** value in the Encoding menu. See Configure 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). 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. 5. Ensure the hardware-accelerated H.264 encoding preset is chosen for all channels.
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 encoding. 2. Increase the **Bitrate** value and/or decrease the **Limit frame rate** value in the Encoding menu. See Configure 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 Check internal storage space and Manage recorded files.

Problem	Action(s) to Resolve
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 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.
Ubuntu not recognizing attached monitor	Legacy Ubuntu systems have poor support for HDMI 2.0, and does not recognize a monitor being plugged into Pearl-2 unless the monitor is plugged into Pearl-2 before the system is turned on.
Feature add-on purchase/activation not working	Currently, Pearl-2 requires internet access to activate new add-ons. If the system has internet access, ensure that there is no firewall preventing access to license.epiphan.com, Port 443.
In Epiphan Live, sources are sometimes invisible in the preview panel	This can occur if the image is too large for the panel. Check the size of the source, and ensure that constraints are applied to each corner of the layout.
Video output port is configured to display 4K video, but the video is not appearing on is configured to display working, but not appearing on the connected 4K monitor	Not all AOC brand monitors are compatible with HDMI 1.4 output. Check the brand of your monitor and attempt on different display.

Problem	Action(s) to Resolve
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.
Web camera is not working correctly.	There are several possible causes of poor performance on web cameras: • The camera itself might be malfunctioning. Try hooking it into a computer to see if the problem remains. • If the picture quality is below standard, try adjusting the settings using the instructions for how to Configure a video input source • Check that your web camera is on our list of supported models. If it is not, try using a supported camera, and if the problem persists, contact our support team.

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)

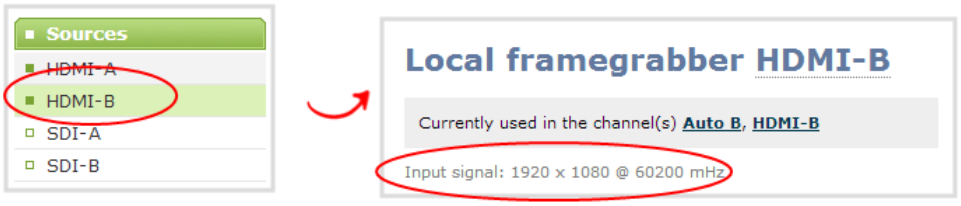
Borders are added to the left and right of the image to preserve the narrower ratio of the input.

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-2, the video source uses the EDID information to determine what resolutions, color depth, and other settings the monitor supports.

EDID is crucial for DVI sources.

The video input ports on Pearl-2 have a factory set EDID. When you connect a video source such as a laptop or camera to Pearl-2, the video source sees Pearl-2 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-2.

Usually, the video input ports on Pearl-2 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-2, you can force the port to supply a specific resolution, color depth, etc to the connected video source.

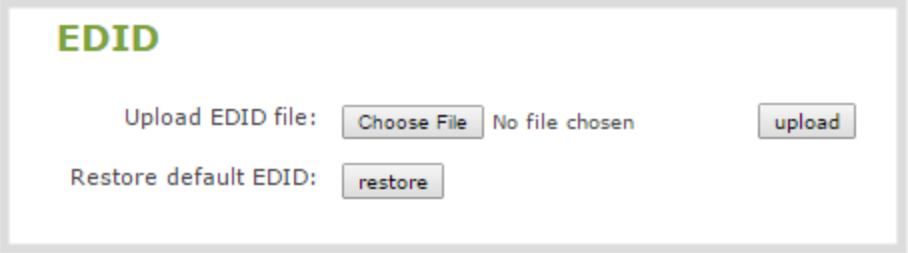
Upload a new EDID

In most cases, the factory installed default EDID works fine for sources connected to the HDMI ports on Pearl-2. However, there may be times when a connected video source uses resolutions that you do not want to use.

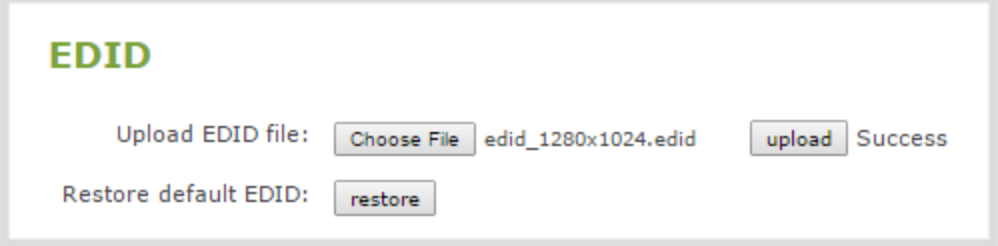
In that case, you can manually upload an EDID and force Pearl-2 to use a specific set of attributes for a specific HDMI input port. All video sources you connect to that HDMI input port will use the EDID you've manually assigned to the port.

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-2.
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.



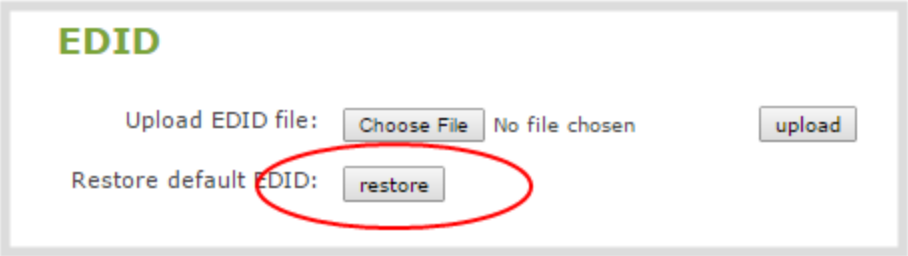
Restore factory default EDID

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

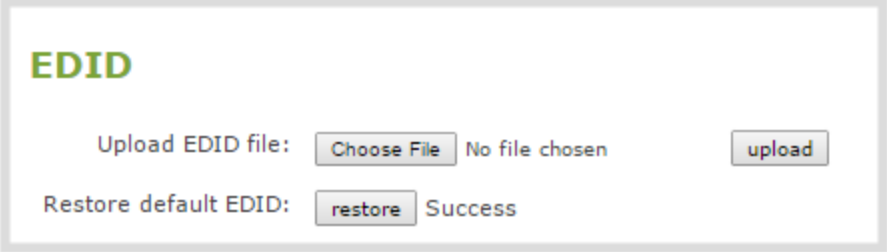
unsure, restoring to factory default is the best approach.

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-2 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**.

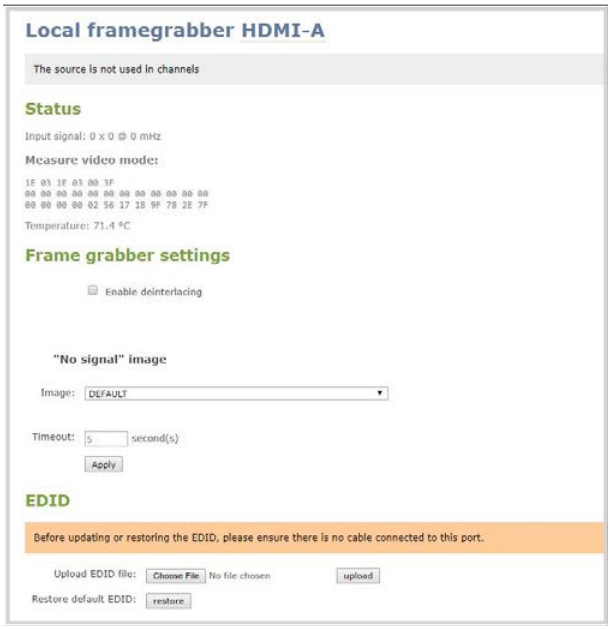
Remove the combing effect on images

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-2 is overloaded, video frames or audio samples can be dropped causing variable frame rate and audio cracks.
  Workaround: Pearl-2 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-2'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-2'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-2 to automatically select the best bitrate setting. For 1 fps, this results in a bitrate of about 1180 kbps.
- Occasionally, a solid black image appears when connecting an AV.io HD capture card to a USB port on Pearl-2.
  Workaround: Reconnecting the capture card resolves the issue and captures the video normally.
- 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-2 or Wowza web UI.
- Interlaced SDI capture is sometimes shifted downwards, resulting in a small green line at the top of the video.
  Workaround: This issue varies with different sources. If it is affecting your capture, the best solution is to crop out the green line in your layout.
- During recording if the touchscreen is used to switch layouts, headphones attached to the audio jack on the front of Pearl-2 sometimes pick up audio crackling and pops during the switching process.
  Workaround: Note that these artifacts do not affect the final recording, only the audio monitoring feature. To avoid the disruption to audio confidence monitoring, use the Pearl-2 Admin Panel or Epiphan Live to switch between layouts.

- 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-2 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.
- If AFU is configured for a channel that is paired with an AV Studio account, recordings that are in the AV Studio queue are deleted after the AFU file is uploaded.
  Workaround: Do not configure AFU for channels that are paired to AV Studio.
- Some audible clicks during playback of AAC formatted recordings at 48, 44, and 22 kHz when using Microsoft Edge versions 41-42.
  Workaround: Record using different encoding settings. Use MP4 at 44 (or 22 kHz), PCM at 44 or 22 kHz (48 kHz is not supported for preview), or AAC at 16 kHz.

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-2 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.
- If you resize your browser window while previewing a channel, a black line may appear along the edges of the page.
  Workaround: Resize the web page again until the line disappears.

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.
- For interlaced HDMI video sources, the letter "P" appears next to the frame size for the Video input instead of the letter "I".
- 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.
- Microsoft Edge sometimes fails to open Epiphan Live.
  Workaround: Refresh the browser page or use a different web browser to open Epiphan Live, such as Firefox.
- After refreshing Epiphan Live, a prompt appears to **Take Over Session**, despite being logged in.
  Workaround: Selecting **Take Over Session** does not stop your session, but rather continues it. Select **Take Over Session** to continue your session.

Affecting video output ports

- Connecting an external monitor to the HDMI 1 port while Pearl-2 is powered on may cause the monitor to not be detected.
  Workaround: Connect an external monitor to the HDMI 1 port before turning on Pearl-2.

Affecting USB devices

- For the IPEVO Ziggi-HD Plus web camera, you must enable the power line frequency setting in the web camera before connecting the camera to Pearl-2.

- The timestamp on the last recorded video frame from a Logitech BRIO 4K camera in 4K mode at 30 fps is approximately 200 ms out of synchronization with the timestamp on the last frame recorded from the same camera when in full HD mode. However, the actual recorded content in Pearl-2 is identical in both modes.

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.
- Software-initiated reboot of Pearl-2 sometimes results in failure to recover.
  Workaround: When possible, use the power button on the front of Pearl-2 to restart the system. If a software reboot is used and the system does not restart as expected, use the power button to try restarting it, or unplug the system for 10 seconds, then re-insert the power cord and use the power button.
- Prolonged operation of Pearl-2 in high temperature environments may cause the system to become unresponsive and stop recording and/or streaming.
  Workaround: If Pearl-2 becomes unresponsive, use the power button to perform a system restart.
- Pearl-2 doesn't synchronize time from a local Windows NTP server.
  Workaround: Avoid using a local Windows NTP server with Pearl-2.

Previous releases and features

This section outlines the features introduced with previous product releases.

Release 4.4.0

- Constant frame rate
- Audio VU meter
- Epiphan Live preview on HTTPS networks
- AFU to an SCP server remote directory creation

Release 4.3.0

- Chroma keying
- Text overlay and custom layout editor enhancements
- Clone channels and custom layouts
- Clone recorders and recorder metadata
- AFU enhancements
- Start and stop individual streams using Epiphan Live
- Logitech BRIO 4K camera support

Release 4.2.0

- USB 3.0 support for web cameras and AV.io UVC video capture cards
- Fully integrated multi-publishing
- Enhanced video cropping
- Audio delay control
- Epiphan Live recordings management

Release 4.0.1

- Launch of Pearl-2 Rackmount models
- 4K add-on

Release 4.0.0

- Inaugural release of Pearl-2 with the following features
    - Capture 6 video sources at once
    - Epiphan Live
    - Switch video sources live
    - Pro video inputs and outputs
    - Pro audio inputs
    - 512 GB data storage (SSD)
    - Touchscreen

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June 20, 2018

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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.

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EN 55022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.

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All disputes arising out of or relating to these Terms and Conditions shall be finally resolved by arbitration conducted in the English language in Ottawa, Ontario, Canada under the commercial arbitration rules of the Canada. The parties shall appoint as sole arbitrator a retired judge who presided in the province of Ontario. The parties shall bear equally the cost of the arbitration (except that the prevailing party shall be entitled to an award of reasonable attorneys' fees incurred in connection with the arbitration in such an amount as may be determined by the arbitrator). All decisions of the arbitrator shall be final and binding on both parties and enforceable in any court of competent jurisdiction. Notwithstanding this, application may be made to any court for a judicial acceptance of the award or order of enforcement. Notwithstanding the foregoing, Epiphan shall be entitled to seek injunctive relief, security, or other equitable remedies from any court of competent jurisdiction.

If any part of these terms is unlawful, void, or unenforceable, that part will be deemed severable and will not affect the validity and enforceability of the remaining provisions. Epiphan may, at its sole discretion and without notice, revise these terms at any time by updating this posting.

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