

Epiphan Pearl Pearl Rackmount Pearl Rackmount Twin



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Specifications

Go to the Recording and Streaming Systems page of the Epiphan website to get the most recent product specifications and additional information about Epiphan Pearl.

Warranty

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

Technical support

Epiphan’s products are backed by our professional support team. If you are having issues with your product, please gather details about your system and contact our team by:

- Emailing support@epiphan.com
- Live chat via the link on our support site <http://www.epiphan.com/support/>
- Phone toll free at 1-877-599-6581 or call +1-613-599-6581

Be sure to include as much information about your problem as possible. Including:

- Problem description
- Details of the video or audio source (type, connection, resolution, refresh rate, etc.)
- Product serial number
- Product firmware version (if applicable, from web admin interface)

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What's new in release 3.16.0?

Firmware release 3.16.0 is the first release for two new rackmount models of Pearl. It also includes much anticipated features that make Pearl an even better addition to your professional AV equipment lineup.

Two new hardware models

Pearl Rackmount

This new rackmount system has all the same features as Pearl but is designed for installation in a rack. It includes an integrated power supply and the power button and USB ports are moved to the front of the system for better access when mounted in a rack.

Pearl Rackmount Twin

This rackmount model includes two completely independent Pearl systems with separate video inputs, power supplies and networking interfaces. It is perfect for high-density rack installation or for cases where you want the convenience of having two systems side by side, such as recording ISOs on one system and streaming curated channels from the other.

New features

Video output ports

All three Pearl models support output of any source or channel through their two on-board video ports. Choose the resolution and content to share using the web admin interface. See [Video output ports](#).

Refined streaming control

With added controls for starting and stopping streaming, you can now control exactly when you are streaming using either the web admin interface or Pearl's touch screen.

Better fleet management

Portable configuration presets let you configure one Pearl system for your campus, next event or fixed installation and copy that configuration to other systems in your fleet. From networking and password setup to channel layouts and backgrounds, bring across as much or as little of your configuration as desired. See [Configuration presets](#).

Progressive MP4 and better Adobe Premiere Pro support

Choose to save recordings as progressive MP4 files for better post-processing support with tools such as Adobe Premiere Pro. (Note that Adobe Premiere Pro does not support variable frame rate files, so small audio offsets are still possible when using it for post processing. For best results, keep Pearl's overall system load below 50%.)

Power button change

To avoid accidental system shutdown, we've updated Pearl's power button to require a double-click to initiate a power down instead of a single click.

Important firmware 3.16.0 upgrade notice

If you have already updated to firmware release 3.15.1 or higher, there are no special firmware update instructions to follow.

For systems running firmware release 3.14.4 or older, read these special notes.

Firmware release 3.15.1 introduced a new visual channel layout editor which adds the ability to have multiple layouts per channel and simplifies custom channel components like text overlays, images, and picture in picture layouts.

The firmware update process preserves your channel's existing encoding, streaming and recording settings and merges your previous visual channel setup in a new channel layout. We have tested this process carefully, but in some circumstances you may still need to do some small manual adjustments to get the best possible results.

Before you do a firmware update, take notes or a snapshot of your channel's layout. It is also a good idea to note your current release version make a configuration backup for the rare case you choose to return to your current release. **After the firmware update**, go to the sources page for your channel and review the created layout for your channel. If needed, make adjustments using the procedures described in [Create a custom channel](#).

Resolved issues

The following issues were resolved in 3.16.0:

- Improved compatibility with Adobe Premiere Pro and video players



Table of contents

What's new in release 3.16.0?	iv
Resolved issues	vi
Table of contents	vii
Start here	1
About this Guide	1
What is Pearl?	2
AV inputs	3
What's in the Box?	4
Front and back view	6
Tech specs	12
Quick start	15
What's Next?	17
PART 1: Setup	19
Rackmount installation	20
The admin interface	21
Connect to the admin interface	21
User administration	26
Pearl's touch screen	39
Touchscreen overview	39
View system information	41
Channel monitoring	43
Pearl's audio jack	46
Control recording	47
Control streaming	48
Configure the touch screen	50
View system information	57
Configure network settings	58
Verify IP Address and MAC address via the touch screen	58
Verify IP address and MAC address via the web interface	59
Configure DHCP	60

Configure a static IP address	62
Tether to a mobile network	65
Perform network diagnostics	67
Configuration presets	69
Configuration presets overview	69
Configuration groups	72
Create a configuration preset	74
Export and import configuration presets	75
Apply a configuration preset from the web interface	77
Apply a configuration preset using the touch screen	78
Apply the Factory default configuration preset	81
Update a configuration preset	83
Delete a configuration preset	84
Configuration preset considerations	85
Configure date and time	90
Verify date and time via the touch screen	90
Verify date and time settings	91
Configure synchronized time (NTP, PTP v1 and RDATE)	92
Configure the date and time manually	93
Change the time zone	94
Configure a local NTP server	94
Video output ports	95
Show a channel on the video output port	98
Show a source on the video output port	100
Select a resolution for the video output port	101
Preview the video output port	102
View the video output port status	102
Disable the video output port	104
Disable or enable the audio on the video output port	104
Configure the audio meter	105

Rename a video output port	106
PART 2: Capture	107
What is a channel?	108
Use the automatic channels Auto A and Auto B	109
Create a simple channel	112
Create a custom channel	115
Configure encoding	143
Add channel metadata	152
Preview a channel	154
Preview all channels at once	156
Rename a channel	156
Delete a channel	157
Live video mixing / switching	159
What is a source?	163
Connect a source	164
Preview a source	165
Configure a source	166
Rename a source	171
Control audio volume	172
Confirm audio levels (via the touch screen)	173
Troubleshoot capture	175
Remove black bars (matte) from the video	175
Force the capture card to use a specific EDID	178
Unstretch the output video	181
Video not centered (VGA sources only)	182
Remove the combing effect on images	183
Video looks squished (VGA sources only)	184
Video too bright, too dark or washed out (VGA sources only)	185
PART 3: Stream	187
What is streaming?	188
Choose a streaming option	188

Supported streaming formats	189
Stream to viewers	190
Stream content using HTTP or RTSP	190
Configure HTTP and RTSP streaming ports	192
Stream content using HLS (HTTP Live Streaming)	193
Send stream URLs to viewers	194
View the Flash stream	195
Viewing with a web browser	198
Viewing with a media player (RTSP)	199
Disable (and enable) streams for viewers	200
Restrict access to streams for viewers	201
Restrict viewers by IP address	202
IP restriction examples	204
Stream to a server	207
Stream to a CDN	208
Stream content using multicast	223
Stream to a media player	228
Stream content using multicast	228
Stream content using UPnP	234
Samples of stream settings	241
Streaming video content	241
Streaming slide content	242
PART 4: Record	243
What is a recording?	244
Recording basics	244
Record a channel via the web interface	245
Record a channel via the touch screen	247
Configure recording file size and type	249
Restart recording	251
Recorders	253
Add a recorder	253

Change the channels recorded by a recorder	254
Record with a recorder	255
Rename recorded files	256
Delete recorded files manually	257
Recorded files	259
View list of recorded files	259
Download recorded files manually	260
Extract tracks from a recording	261
Rename recorded files	263
Delete recorded files manually	263
File and recording transfer	265
Automatic file upload (AFU) overview	265
Choose files to include in AFU	266
Enable and set timing for AFU	268
AFU to an FTP server	271
AFU using RSync	272
AFU using CIFS	273
AFU to a secure FTP server	275
AFU using SCP	277
AFU or copy to USB drive	278
View the AFU log	285
Manage the AFU queue	286
Local FTP server	288
Configure the local FTP server	288
Using the local FTP Server	289
PART 5: Maintenance	292
Mobile / tablet operator interface	293
Connect to the tablet interface	293
Confidence monitoring using the tablet interface	295
Verify disk space via the tablet interface	297

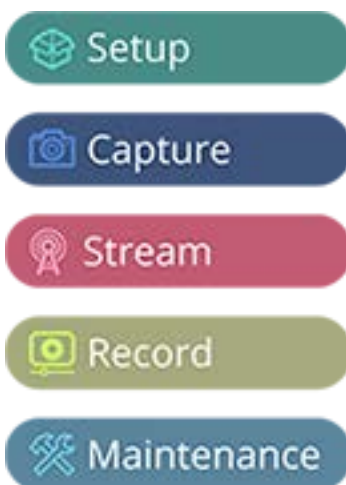
Control recording via the tablet interface	297
Switch to the full admin interface	298
Power down and system restart	299
Restarting the device via the web interface	299
Shutting down the device via the web interface	299
Shutting down the device manually	300
Save and restore device configuration	301
Perform factory reset	302
Restore factory configuration via the web interface	302
Firmware upgrade	304
Check for firmware updates	304
Install firmware	305
Support	309
Download logs and "allinfo"	309
Configure remote support	311
Disable remote support	312
Storage disk maintenance	313
Check disk storage space	313
Check disk storage space via the touch screen	314
Schedule disk check	314
Perform disk check	315
Third party integration	316
Control with RS-232 / serial port	317
Control with HTTP commands	323
Configuration keys for third party APIs	327
Troubleshooting	340
Limitations and known issues	343
Previous releases and features	346
Software and documentation license	348

Start here

Welcome, and thank you for buying Epiphan Pearl™, Pearl Rackmount™ or Pearl Rackmount Twin™. This guide is designed to help you configure your new system.


The three Pearl models are described in the [What is Pearl?](#) and [What's in the Box?](#) sections. Read the [Quick start](#) guide for the basic steps to get a single video (and optional audio) source configured as a streamable, recordable output from Pearl.


Following the quick start section, a set of task-based procedures help you to tweak the system exactly how you want it. These procedures are broken into five categories: [Setup](#), [Capture](#), [Stream](#), [Record](#) and [Maintenance](#).



About this Guide

Throughout this guide there are situations where more than one solution will complete a task. In those cases the guide describes the simplest or most common variation first. Warnings, tips and notes are depicted as follows.

 This is a warning. Pay special attention to information in red boxes.

 This is a tip or note. Data in green boxes help you get the most from your new system.

What is Pearl?

Pearl, our most versatile live video production switcher, is a video encoder, video streamer, live switcher and video recorder that comes in three models.

All three models have the same functionality, and this guide applies for all three models. Where used in this guide, the product name Pearl is interchangeable for Pearl Rackmount or Pearl Rackmount Twin, except in a few cases where physical differences are explicitly called out.

Pearl



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

Pearl Rackmount



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

Pearl Rackmount Twin

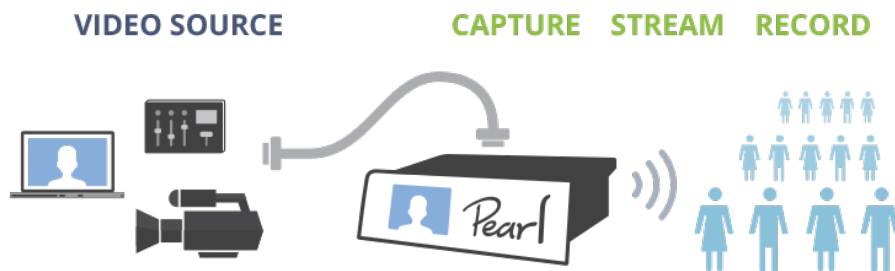


A high density 2U rack mount variation that contains two complete (and independent) Pearl systems.

With Pearl, you can capture, record and stream computer monitors, radar displays, or anything that outputs to SDI, HDMI, DVI-I (single link), VGA or component. Accompanying audio capture is supported via SDI, HDMI and TRS.

Simultaneously capture four audio visual sources and choose how you want to record and stream them. Keep them separate, configure them in multi-source layouts for live switching, or do both!

The resulting streams can be viewed a number of ways through media players, browsers, on mobile devices and through 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 does not capture from HDCP encrypted sources.

Using Pearl effectively

Pearl, Pearl Rackmount and Pearl Rackmount Twin are powerful live video production systems. They can perform many different tasks, however, like any other computer system, there is a limit to the number of concurrent tasks they can run smoothly.

For best results, we recommend you always keep Pearl's CPU usage under 70%. You can check the **Overall system load** from the **Info** page

Pearl D569D134 info

Firmware
Version: 3.15.1b
Revision: 31252_1743
Date: 2015-06-11

Hardware
CPU board: D53427RKE (687790-405)

Channels

#	Channel name	Status	Video source	Audio source	Stream	Bitrate	Actual bitrate	Frame size	FPS / Actual FPS	Port
1	Auto_A	ok	Auto A	3 sources	H.264+AAC	auto	5558 kbps	1920x1080	30 / 30.0	8000 View
2	Auto_B	ok	Auto B	3 sources	H.264+AAC	auto	6905 kbps	1920x1080	30 / 30.0	8001 View
3	Channel_3	ok	2 sources	No sources	H.264+AAC	auto	6166 kbps	1920x1080	30 / 29.5	8002 View

Overall system load: 51%

The actual number of tasks your Pearl can complete concurrently depends on many factors including how many channels you have, how many layouts you have per channel, how often you are switching layouts, whether or not the system is resizing input signals, frame rate and bit rate per channel, whether or not you are using the video output ports etc.

If you find that system load is higher than recommended, disable any unused video output ports, remove unused channels or layouts, reduce the number of channels created or ensure sources come in at the right resolution to avoid CPU time spent scaling.

AV inputs

Pearl supports the following AV inputs directly. Nearly every other AV input is supported provided you have the correct converter or adapter.



When using Pearl it is recommended you use a maximum of four simultaneous input sources.

Table 1 Inputs for Pearl

SDI	SDI Audio (Linear PCM)	HDMI™ / DVI-I (single link)	HDMI Audio (Linear PCM)	VGA	Left/Right TRS Audio (Balanced)
2	✓	2	✓	2	2

* Pearl only captures video and audio from HDMI sources if the content is not HDCP-protected.

What's in the Box?

Pearl comes in three models. Pearl, our original portable model, and two new rackmount models that include integrated power supplies and front-panel access to power and USB.



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




Inside the box with your Pearl system, you'll find the power cable and the following items (for Pearl Rackmount Twin you'll receive two sets of these cables):

1. One SDI cable
2. One HDMI cable
3. One VGA cable
4. One DVI (male) to HDMI (female) adapter
5. One Ethernet cable
6. One power supply cable (and power supply brick with the standard Pearl model)

The following table will help you identify the cables included with your Pearl system. Note these images are for identification purpose only. The cables included with your system may be different with respect length, color, cable casing or shielding.

Table 2 Description of Included Cables (images for identification only, color and appearance may vary)

Image	Name	Description
	SDI cable	Connects SDI sources to Pearl's SDI ports.
	HDMI cable	Connects HDMI or DVI sources to Pearl's HDMI ports.
	VGA cable	Connects VGA (or Component, if used with a converter) signals to Pearl's VGA ports.
	DVI (male) to HDMI (female) adapter	Connects DVI sources to Pearl. Connect the adapter to the output on your screen or device, then connect the provided HDMI cable to the adapter and one of the HDMI ports on Pearl's back panel.

Image	Name	Description
	RJ-45 Ethernet cable	Connects the system to your network.

Front and back view

Pearl's front panel has the power indicator light, audio monitor jack and touch screen display for confidence monitoring and simple configuration. The rear has an array of familiar computer connections. See below for a complete listing of Pearl's physical features.

Pearl



Table 3 Pearl front panel descriptions

Label	Name	Description
1	Touch screen front panel display	Used for confidence monitoring and simple configuration such as obtaining system information and starting/stopping recordings.
2	3.5 mm audio jack	For audio confidence monitoring. Plays the audio for the currently visible channel.

Label	Name	Description
3	Power light	Glows when the system is powered on.



Table 4 Pearl back panel descriptions

Label	Name	Description
1	Power button	Press to turn on. Double-click to initiate a graceful system shutdown.
2	Power jack	Plug the power supply in here. The port requires a 19 V center-positive DC power source. Always use the provided power supply.
3	USB 2.0 ports	For connection of external hard drives, flash drives or control interfaces. See Record for recording to a USB drive.
4	DisplayPort ports	Video output ports. See Video output ports for more details.
5	RJ-45 Ethernet	Auto-sensing gigabit Ethernet 10/100/1000 Base-T network port. See Configure network settings for setup instructions.
6	SDI in	Connects SDI signals to Pearl.
7	VGA in	Connects VGA and other analog video signals to Pearl.

Label	Name	Description
8	HDMI in	Connects HDMI and DVI signals to Pearl.
9	TRS audio in	Connects balanced (line level) left/right TRS audio to Pearl.
10	Lock	Allows Pearl to be locked to a desk or surface using a laptop lock cable.
11	Row A/B designators	This manual and Pearl's web admin interface refer to video input ports on row A and row B. Ports above the line are part of row A, ports below form row B.

Pearl Rackmount



Table 5 Pearl Rackmount front panel descriptions

Label	Name	Description
1	Touch screen front panel display	Used for confidence monitoring and simple configuration such as obtaining system information and starting/stopping recordings.
2	USB port	Two other USB ports are located on the back. See Record for information about recording to USB drives.
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 to turn on. Double-click to initiate a graceful system shutdown.



Table 6 Pearl Rackmount back panel descriptions

Label	Name	Description
1	Power jack	Plug the power supply in here. Always use the provided power supply.
2	USB 2.0 ports	For connection of external hard drives, flash drives or control interfaces. See Record for recording to a USB drive.
3	DisplayPort ports	Video output ports. See Video output ports for more details.
4	RJ-45 Ethernet	Auto-sensing gigabit Ethernet 10/100/1000 Base-T network port. See Configure network settings for setup instructions.
5	SDI in	Connects SDI signals to Pearl.
6	VGA in	Connects VGA and other analog video signals to Pearl.
7	HDMI in	Connects HDMI and DVI signals to Pearl.

Label	Name	Description
8	TRS audio in	Connects balanced (line level) left/right TRS audio to Pearl.
9	Row A/B designators	This manual and Pearl's web admin interface refer to video input ports on row A and row B. Ports above the line are part of row A, ports below form row B.

Pearl Rackmount Twin

This model is comprised of two completely independent Pearl systems. The diagrams below show callouts and labels for one of the two systems, the second (on the right side of the images) has all the same features.



Table 7 Pearl Rackmount Twin front panel descriptions

Label	Name	Description
1	Touch screen front panel display	Used for confidence monitoring and simple configuration such as obtaining system information and starting/stopping recordings.
2	USB port	Two other USB ports are located on the back. See Record for information about recording to USB drives.
3	3.5 mm audio jack	For audio confidence monitoring. Plays the audio for the currently visible channel.
4	Power button and LED	Press to turn on. Double-click to initiate a graceful system shutdown.



Table 8 Pearl Rackmount Twin back panel descriptions

Label	Name	Description
1	Power jack	Plug the power supply in here. Always use the provided power supply.
2	USB 2.0 ports	For connection of external hard drives, flash drives or control interfaces. See Record for recording to a USB drive.
3	DisplayPort ports	Video output ports. See Video output ports for more details.
4	RJ-45 Ethernet	Auto-sensing gigabit Ethernet 10/100/1000 Base-T network port. See Configure network settings for setup instructions.
5	SDI in	Connects SDI signals to Pearl.
6	VGA in	Connects VGA and other analog video signals to Pearl.
7	HDMI in	Connects HDMI and DVI signals to Pearl.
8	TRS audio in and Row A/B designators	Connects balanced (line level) left/right TRS audio to Pearl. This manual and Pearl's web admin interface refer to video input ports on row A and row B. Ports above the line are part of row A, ports below form row B.

Tech specs

This table outlines the technical specifications for Pearl. Go to www.epiphan.com/pearl to get the most recent product specifications and additional information about Pearl.



The table below shows the number of inputs and output connectors for Pearl and Pearl Rackmount. Pearl Rackmount Twin is comprised of two completely independent Pearl systems, therefore has double the number of every input, output and component that Pearl and Pearl Rackmount have.

Table 9 Specifications for Pearl

Video Inputs	Connectors	(2) SDI (2) HDMI™ / DVI ¹ (2) VGA
	Resolutions	VESA modes: 640×480 to 2048×2048 (or 2650×1600); Custom HDMI/VGA/DVI/SDI modes up to 1920×1200
	HD Video Format Options	3G-SDI; HD-SDI; SD-SDI; DVI single link; HDMI; R, G, B plus separate HSync and VSync signals; R, G, B plus CSYNC signal; R, G, B with Sync-on-Green synchronization
Audio Input	Connectors	(2) ¼" left/right TRS audio (line level, balanced) SDI audio HDMI audio
Video Output	Connectors	(2) DisplayPort (software selectable content) with audio for local video display or larger confidence monitoring
	Built-In Display	Front touch screen display used for system information, confidence monitoring, simple configuration and recording control.
Audio Output	3.5 mm audio	Front-mounted jack for confidence monitoring
Built-in Display	Front touch screen display for live switching, confidence monitoring, quick configuration, system information, recording control and streaming control	

Video Encoding	Video Codecs	H.264, MPEG-4, Motion JPEG		
	Video Bit Rates	100 - 9,999 kbit/sec		
	Key Frame Intervals	Programmable		
	Color Resolution	4:2:0		
	Output Frame Size	Configurable up to 3840x2160		
	Frame Rates (per output stream)	60 fps at 1920x1080 capturing and streaming 2 sources simultaneously 30 fps at 1920x1080 capturing and streaming 4 sources simultaneously		
Audio Encoding	Audio Codecs	Encoder	Bitrate	Sample Frequencies
		MP3	64-192 kbps	22 kHz, 44 kHz, 48 kHz
		PCM	-	22 kHz, 44 kHz, 48 kHz
		AAC	64-192 kbps	16 kHz, 22 kHz, 44 kHz, 48 kHz
IP Network Interfaces	Connector	10/100/1000 Ethernet RJ45		
	Streams	MPEG-TS, FLV, ASF and MJPEG		
		RTSP over TCP/UDP		
		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 ²	Portable model: 1 TB HDD Rackmount models: 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 (2) USB 2.0 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). RS-232 API integration requires a USB to RS-232 adapter (not included).	
Time Synchronization	NTP, TIME (RFC 868), PTP v1 (IEEE-1588-2002 V1)	
Product Dimensions	Pearl: 10 $\frac{5}{8}$ " × 3 $\frac{1}{4}$ " × 7 $\frac{3}{8}$ " (270mm x 82mm x 187mm) Pearl Rackmount: 19 $\frac{5}{8}$ " × 3 $\frac{1}{2}$ " × 10 $\frac{5}{8}$ " (498 mm × 89 mm × 270 mm) Pearl Rackmount Twin: 19 $\frac{5}{8}$ " × 3 $\frac{1}{2}$ " × 10 $\frac{5}{8}$ " (498 mm × 89 mm × 270 mm)	
Product Weight	Pearl: 3.4 lbs (1.54 kg) Pearl Rackmount: 12.1 lbs (5.5 kg) Pearl Rackmount Twin: 14.6 lbs (6.6 kg)	
Country of Origin	Made in North America (Canada)	

¹Using HDMI port, with the supplied adapter

²A 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.

Quick start

This section helps you get up and running quickly with your Pearl. The instructions are the same regardless of the model you are using. If using a rackmount model, you can choose to have it already installed in a rack, or it can be placed on a desk.

Before you get started, make sure you have:

- a video source (i.e. a camera, a computer, a tablet, or a phone) (for HDMI, the source must not be HDCP protected)
- for SDI or HDMI sources, accompanying audio over the same source cable, or optionally, for VGA sources, audio from a TRS source
- the appropriate cables or adapters to convert the output to SDI, HDMI or VGA (if needed)
- ideally, a network with Dynamic Host Configuration Protocol (DHCP)
- a computer with a web browser connected to the same network (this is referred to as the “admin” computer in the steps below)

Pearl is pre-configured with two plug and play channels: Auto A and Auto B. This quick start uses these channels to get you streaming and recording as soon as possible.



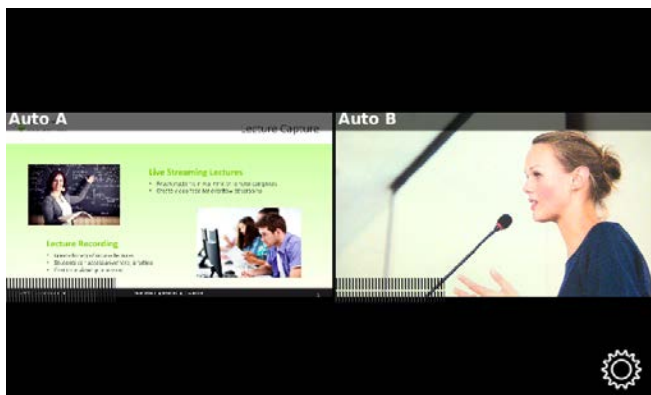
If you're using a Pearl Rackmount Twin, be sure to follow all the steps below using one of the two systems (i.e. you cannot plug a source into one system and use it from the other).

Get started quickly with auto channels:

1. Turn on your HD source and connect the output cable to a port in Row A on the back of Pearl (if needed, use an adapter such as the DVI to HDMI adapter).
2. If desired, plug a second source into one of the Row B inputs on the back of the system.
3. Optionally, for VGA sources, attach a set of left/right TRS audio cables from your audio source to the TRS audio input ports (on same row as the VGA source) on the back of Pearl.
4. Connect the Ethernet cable to the Pearl. Connect the Ethernet cable to your network.
5. Attach the power cable to the system and plug it into a power source.
6. Press the power button (located on the front for rackmount models, on the back for portable Pearl) to turn on the system.
7. Wait for the Pearl to complete the power-up sequence. The system is ready a few moments after the power LED illuminates.
8. (optional) Plug speakers or headphones into the 3.5 mm audio jack at the front of Pearl.

The system automatically configures the channel's frame size to match the source resolution and calculates the best bit rate for the default frame rate of 30 fps. Audio is a mix of SDI, HDMI and TRS audio inputs along the same A or B row (SDI or HDMI audio must be unencrypted).

Pearl's front screen, if enabled (it is enabled by default, see [Configure the touch screen](#)), updates to show you previews of your channel(s) for confidence monitoring. Use your speakers or headphones to verify audio quality and levels.



To view the auto channels:

You can start viewing the channel(s) immediately by using a browser on a computer on the same network.

1. Find the system's IP address: from a single channel view or grid view, touch the system settings (**gear**) button then touch **System Status**.

Device		Status	
Serial	D569D134	Date	1-Jun-2015
Grabber	D2P280194	Time	16:18:46
Firmware	3.15.1a	Uptime	2:37:09
		t, °C	77.0 / 53.6
Network		Storage	
IP Address	192.168.0.183	929.8 free of 929.9 GB	
MAC	C0:3F:D5:69:D1:34	<div style="width: 100%; height: 10px; background-color: black;"></div> 100%	

2. Open a browser window on a computer on the same LAN or network
3. Browse to one of the following URLs:

For Auto A: <http://<IP Address for Pearl>/preview.cgi?channel=1>
For Auto B: <http://<IP Address for Pearl>/preview.cgi?channel=2>
For example: <http://192.168.0.183/preview.cgi?channel=2>

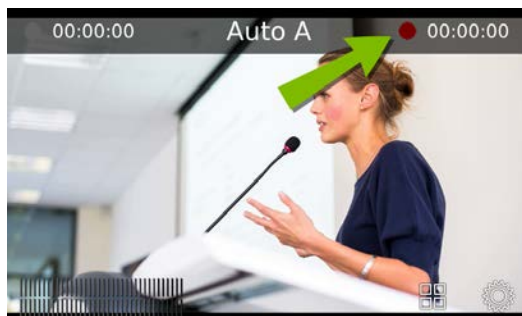
You'll find alternate connection streams (i.e. RTSP or MPEG-TS) for these channels by logging into the admin interface and accessing Auto A and Auto B by the links under the Channels menu. See [What is streaming?](#)

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 web interface.

To control recording from the touch screen:

1. If viewing the grid view, touch the channel for which you wish to control recording; the channel view is displayed.
2. If the channel controls are not displayed on the screen, simply touch the screen to bring them up.
3. Touch the recording control button; the touch screen will start a timer to indicate the length of the recording. Touch the control again to stop recording. (If the button is not visible, recording control via the touch screen is not enabled; see [Configure the touch screen.](#))



To control recording from the web interface:

1. From the web interface, scroll to the **Channels** section.
2. Click **Recording** for your channel; the Recording page is displayed.
3. Click the red **Start** button; the text at the top of the screen changes to indicate the recording is starting, then indicates the length of time since the recording started.
4. Click the black **Stop** button; the recorder stops.
5. Refresh the page by clicking **Recording** again; the page reloads and a file list appears that shows your newly recorded stream snippet.
6. Click the file name to download and view your recording.

What's Next?

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

- [Video output ports](#)
- [Create a simple channel](#)
- [Create a custom channel](#)
- [Add an audio source \(custom channel\)](#)
- [Live video mixing / switching](#)
- [What is streaming?](#)
- [File and recording transfer](#)
- [User administration](#)

When you have completed system tuning, make sure to back up the system configuration using the procedure described in:

- [Create a configuration preset](#)

Refer to the table of contents for a complete list of the topics covered.

PART 1: Setup

If you followed through the quick start guide, you already have a basic configuration and possibly a recording of an input. Before you tweak the channel or configure more, this part of the manual helps you to get your Pearl properly configured for your network.

Topics covered:

- Rackmount installation
- Connect to the admin interface
- Configure the touch screen
- User administration
- View system information
- Configure network settings
- Configure date and time
- Configuration presets
- Restrict viewers by IP address

Rackmount installation

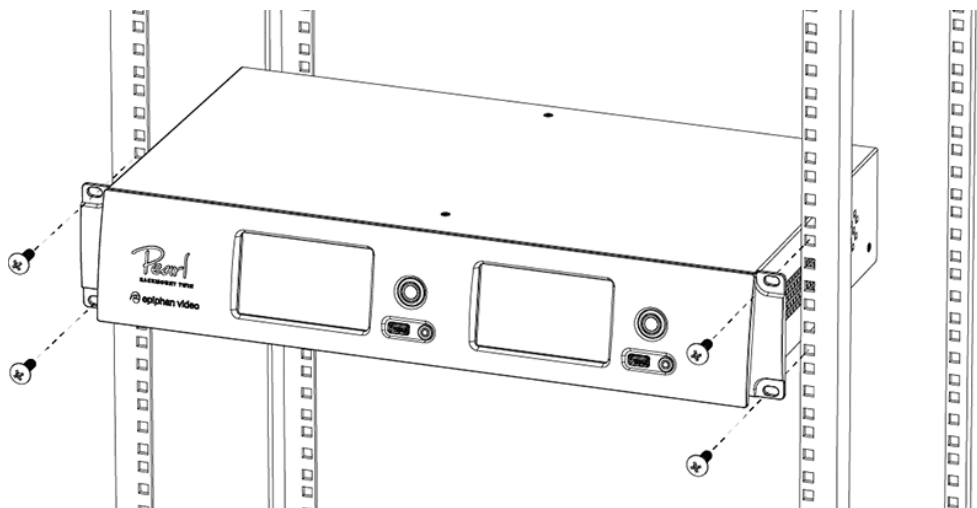
All Pearl models can be used in desktop mode, with the system placed on any flat, stable surface. They are also all rackmountable into fixed racks or portable rack cases like the one depicted below.



If you purchased Pearl Rackmount or Pearl Rackmount Twin, you can install your system directly into a 24-inch rack. For the smaller, portable Pearl 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 Rackmount or Pearl Rackmount Twin in a 24-inch rack:

1. Ensure you have the correct bolts needed for your rack (not included). Pearl'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 24-inch rack.
3. Attach four bolts as shown below.



The admin interface

Pearl is managed from a web interface. This means to perform administrative tasks with Pearl you use an internet browser on a PC (or laptop, or tablet) connected to the same local Ethernet network.

Connect to the admin interface

If you know the IP address of the system you may type it into the address bar of your web browser.

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

However if this is the first time you access your system, you likely don't know the IP address, so you can use one of the following connection methods:

For networks with DHCP use one of the following procedures:

- [Connect using the touch screen](#)
- [Connect via DNS-based service discovery](#)
- [Connect via the Epiphan discovery utility](#)

For networks without DHCP, use the following procedure:

- [Connect via persistent static IP address](#)



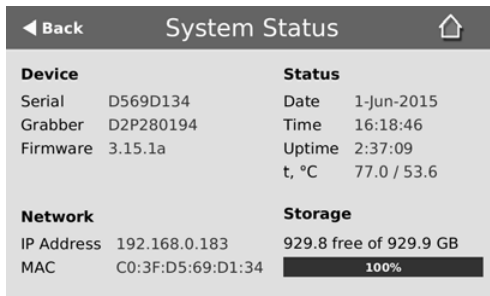
You can also connect to a reduced Operator tablet interface. See **Connect to the tablet interface**.

Connect using the touch screen

To connect to the web admin interface, you need to know your Pearl's IP address. There are a number of ways to determine the IP address, but the simplest way is to use the touch screen, if it is enabled.

To connect to the web admin interface using the touch screen to determine the IP address:

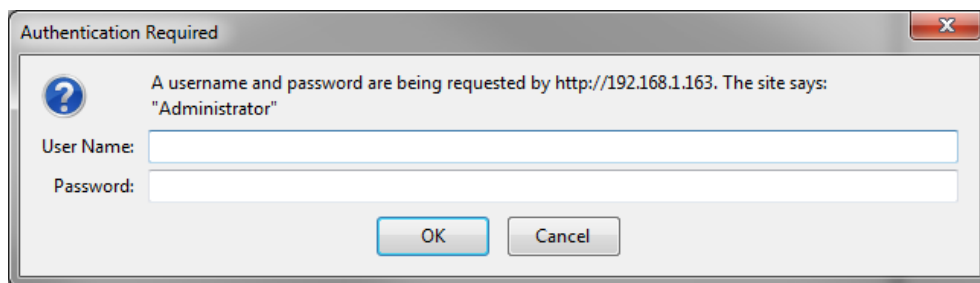
1. Obtain the IP address using the touch screen:
 - from a single channel view or grid view, touch the system settings (**gears**) button then touch **System Status**; or
 - if your system doesn't have any channels showing, touch the screen anywhere to move to the system settings screen then touch **System Status**.



- 2. Type the following string into the address bar of your web browser on your admin computer (where <ip address> is the ip address of your Pearl)

```
http://<ip address>/admin  
For example: http://192.168.1.163/admin
```

- 3. Enter the user name and password then click **OK**. The administrative user is 'admin'. Initially no password is set. To set a password follow the procedure outlined in [User administration](#).



Connect via DNS-based service discovery

Pearl 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.

To ensure you have compatible software, refer to the following table.

Table 10 Installing Bonjour Print Services

System	Action Needed
Microsoft Windows	You must install Bonjour Print Services: <ol style="list-style-type: none">1. Use the following URL - http://support.apple.com/kb/DL9992. Click Download.3. Follow the system prompts to download and install the application.

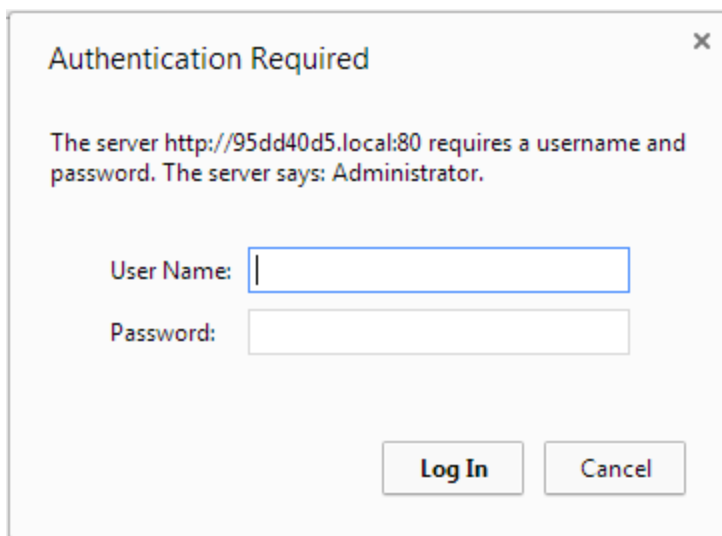
System	Action Needed
Mac OS X	The Bonjour software used for service discovery is built into the Mac OS. No special actions are needed.
Linux	The Avahi implementation used for DNS-based discovery is shipped with most Linux distributions. If necessary, check with your administrator to ensure you have the Avahi package installed.

To access Pearl's web interface via DNS service discovery:

- Find the system's serial number. It is printed on a sticker on the back of the system, or available on the system information display on the touch screen. To access the serial number:
 - from the "no channels" screen, touch the screen anywhere to move to the system information screen;
 - from a single channel view, touch the system information button; or
 - from the grid view, select a channel, then touch the system information button.
- Type the following string into the address bar of your web browser on your admin computer (where <serial> is the serial number of your Pearl):

```
http://<serial>.local/admin
For example: http://95dd40d5.local/admin
```

- Enter the user name and password then click **OK**. The administrative user is 'admin'. Initially no password is set. To set a password follow the procedure outlined in [User administration](#).



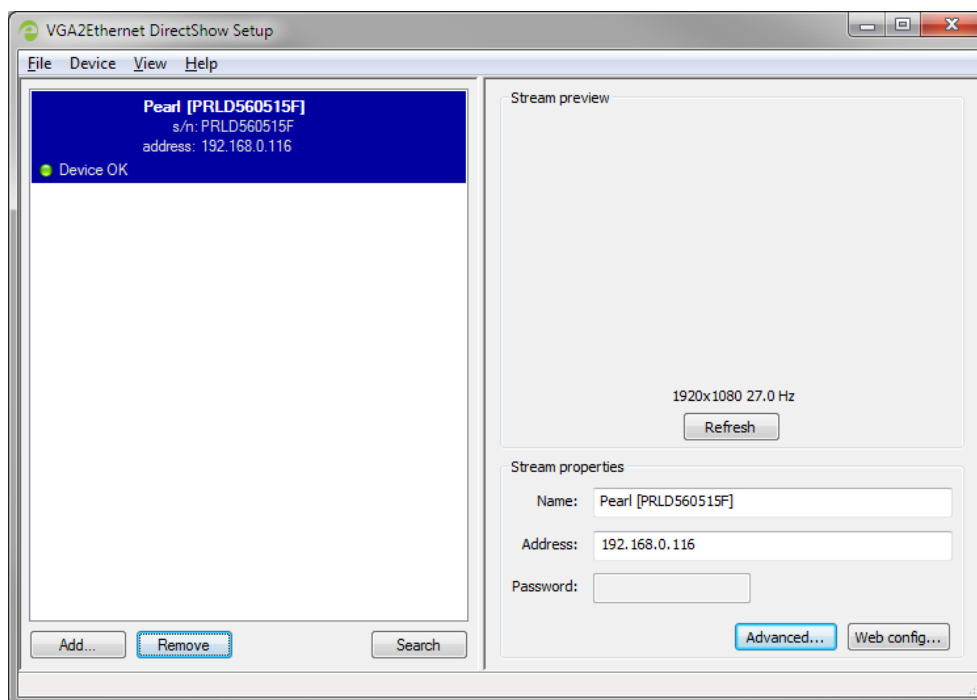
4. Optionally, navigate to the **Network** link under the Configuration heading and note the **IP address** of the system.

Connect via the Epiphany discovery utility

Epiphany provides a utility for discovering Epiphany systems on your network. The Epiphany 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: <http://www.epiphany.com/downloads/NetworkDiscovery.exe>.

To access the Pearl's web interface via the Epiphany discovery utility:

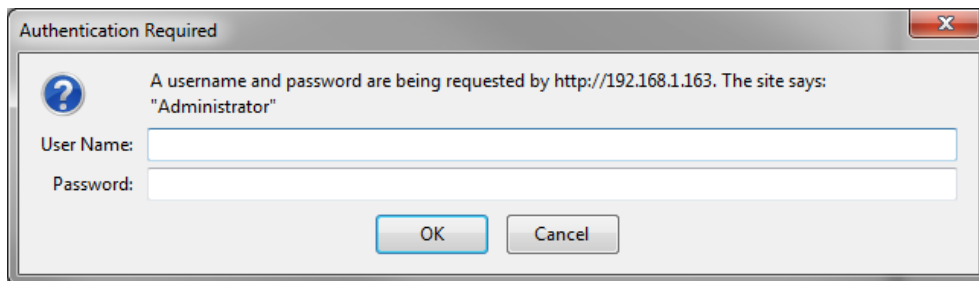
1. Launch the discovery utility.
2. Click **Search** to find all the Epiphany systems on the network; a list similar to the following appears.



3. If more than one system appears, select the one you wish to configure by matching the serial number listed with the serial number marked on the back of the system.
4. Optionally, note the **IP Address** shown in the stream properties. Use this for quicker access to the system on future configuration sessions.
5. Click the **Web config** button; your browser will open and point to the web interface page.

<http://<IP Address for Pearl>/admin>

6. Enter the user name and password then click **OK**. The administrative user is 'admin'. Initially no password is set. To set a password follow the procedure outlined in [User administration](#).



Connect via persistent static IP address

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

To perform this procedure you will need a workstation computer for which you are able to modify network settings.

Pearl is pre-configured with the following static address defaults:

- 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 Pearl's web interface via the persistent static IP address:

1. Establish an Ethernet connection between Pearl and the workstation by one of the following methods:
 - a. Connect the system to a local Ethernet network shared with the workstation.
 - b. Connect the system directly to the workstation's Ethernet port using either a regular or a crossover Ethernet cable.
2. Record the network settings of the workstation being used to connect to Pearl 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 browse to: **http://192.168.255.250/admin/**
5. Log in as the administrator user with the user name admin and the admin password (by default there is no password); the web interface page opens.
6. Click the **Networking** link in the Configuration menu.
7. Select the radio button to **use a static address** and configure the system with a static IP address and network settings relevant to the network being used. For specific details about the settings presented, see [Configure network settings](#).
8. Restore the previously saved network configurations on the workstation.

User administration

Pearl has three configured users:

- admin
- operator
- viewer

By default, none of these users have passwords. For security purposes you should add passwords to the admin and operator accounts.

This section describes the following user administration topics:

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

User types and privileges

Pearl's three user accounts are admin, operator and viewer. The user account names cannot be changed and the accounts cannot be disabled. By default, none of the accounts have passwords.

Admin

The admin account is the main operator used for all system configuration. This user has access to all options in the web interface.

Operator

The operator account is a subclass of the admin account. The operator can log in and view all configuration items but may only make changes to a small number of options. This account is intended for an operator to start and stop recordings, download recordings, switch layouts while live streaming or perform network diagnostics.

Viewer

The viewer account is for all end-users who are permitted to view the streamed channels. By default, when there is no password, users are not prompted for a username and password when viewing a channel. The viewer username and password prompt appears only when there is a viewer password set.

In addition to the global viewer account, each channel can set a viewer password that overrides the global value. See [Restrict access to streams for viewers](#).

Current user

When logged in to the web interface, the current username is displayed at the top right corner of the screen.



User privileges

The following table outlines the privileges for each user:

Table 11 *User privileges in the web interface*

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			✓

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

Action or Menu Option	viewer	operator	admin
Upload Branding Images			✓
Upload Branding Templates			✓
Select Branding Template			✓
Enable Remote Support			✓
Backup Device Configuration			✓
Restore Device Configuration			✓
Restore Factory Configuration			✓
Reboot Device (via Web Interface)			✓
Shutdown Device (via Web Interface)			✓
Configure Time Until Next Disk Check			✓
Perform Disk Check			✓
View Disk Information		✓	✓
Upgrade Firmware			✓
View System Information		✓	✓

Set or change user passwords

By default, admin, operator and viewer have no assigned passwords. Both the admin and the operator user have access to the web admin interface, so you should always set a password for both admin and operator accounts. Refer to your system administrator for your organization’s specific password requirements.



If the admin password is defined and the operator password is undefined, then the operator uses the admin password by default.

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](#).

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.



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.

If you lose the admin password, refer to the section [Overcome lost passwords](#).



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 interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Access passwords** link in the Configuration menu; the password configuration page opens.
3. Highlight and delete the **current password** for your selected user (the password is currently masked as dots).



For security reasons, the current password appears as eight dots regardless of password length, and even if there is no password 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.

If desired, you may specify multiple account passwords on the same page before clicking Apply.

Remove user passwords

If you want to remove passwords for one or more user accounts, you may do so via the web interface. 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 interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Access passwords** link in the Configuration menu; the password configuration page opens.
3. Highlight and delete the current password for your selected user (the password is currently masked as dots).



For security purposes, the current password appears as eight dots regardless of password length, and even if there is no password set.

4. Highlight and delete the **confirmation password** for the selected user.
5. Click **Apply**.
6. 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 interface as **admin**. See [Connect to the admin interface](#).
2. Click the **Streaming** link for the channel; the channel's Streaming configuration page opens.
3. From the Access control section do one of the two following things:
 - a. clear the **viewer password** field; or
 - 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 web interface as admin 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, you can contact Epiphan support to request a remote password change. See [Support](#). If remote support is disabled, you will need to return the system to Epiphan for password recovery. Contact Epiphan support to discuss this option.

Configure LDAP

You can use the Lightweight Directory Access Protocol (LDAP) for authentication into the system. Specify user roles by using group DN's for users who log in as the administrator, operator or as a viewer.



The system has only **one** admin user and **one** operator: LDAP users log in as either the admin or operator, they do not have their own private profiles.



When enabled, LDAP authentication is an **alternative** to the regular system usernames and passwords. You may still login as **admin**, **operator** or **viewer** using the passwords for those accounts. Furthermore, any LDAP users with the name admin, operator or viewer are ignored. The local accounts are used instead.

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

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 for your Pearl:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Access passwords** link in the Configuration menu; the password configuration page opens.
3. Scroll to the **LDAP authentication** section.

LDAP authentication:

Enable LDAP authentication

Server address[:port]

Connection encryption

Bind DN

Bind password

Base DN

Search attribute

Administrators (group DN)

Operators (group DN)


Viewers (group DN)


4. Click the **Enable LDAP authentication** checkbox to enable LDAP authentication (or uncheck to disable).
5. Specify the server IP address and (optional) port for your LDAP server (i.e. 192.168.1.101:389) in the **Server address[:port]** field.
6. Use the **Connection encryption** drop-down to specify the type of encryption, if any used by your LDAP server.

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.

7. Specify the fully qualified DN and password for LDAP bind in the **Bind DN** and **Bind password** fields. (The password masked as dots on the screen.) These fields are only needed if your LDAP server does not support anonymous binding.
8. In **Base DN**, specify the baseObject in which to search for entries. The system will search this object and the whole subtree starting at the base DN.
9. By default the search attribute is *uid*, which is suitable for a unix environment. 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.
10. 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 *uniqueMember* 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).
11. 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 *uniqueMember* 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).
12. 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 *uniqueMember* 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).
13. 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).

 In one case, 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 or the channel overrides the global password with a blank password), the viewer must authentication with LDAP, he may **not** alternatively use the **viewer** account with a blank password.

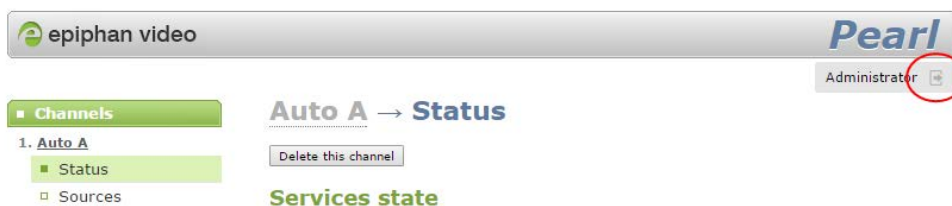
Change the logged-in user


When you log in to the web interface as admin or operator, your browser remembers this configuration and automatically logs you in as the same user when you go back to the site.

Sometimes you need to change from operator to admin, or vice versa.

To change the logged-in user:

1. Click the logout button at the top right of the screen (beside your user name); you are logged out.



 Some browsers may require you click the button twice before the log out action executes.

Restrict viewers by IP address

Pearl permits you to restrict which computers can access broadcasts by building a list of allowed and/or 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 below.



IP address restriction is valid for the viewer only and does not affect the web admin interface or the mobile configuration interface.

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 username (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 you're not familiar with creating allow/deny lists, refer to the examples below this procedure for assistance with crafting your lists.

To restrict viewers by IP address:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Access passwords** link in the Configuration menu; the password configuration page opens.
3. Type allowed IP addresses or address ranges in the **Allow IP's** field. Separate addresses with a comma.
4. Type denied IP addresses or address ranges in the **Deny IP's** field. Separate addresses with a comma.
5. Click **Apply**.

To restrict viewers of a specific channel by IP address:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Streaming** link for the desired channel; the streaming configuration page opens.
3. From the **Access Control** drop-down, select **Use these Settings**; local password and Allow/Deny IP lists are enabled.
4. If desired, type a password for the viewer in the **Viewer Password** field.
5. Type allowed IP addresses or address ranges in the **Allow IP's** field. Separate addresses with a comma.
6. Type denied IP addresses or address ranges in the **Deny IP's** field. Separate addresses with a comma.
7. Click **Apply**.

If a user attempts to connect to the stream from a disallowed IP address, access is denied. If connecting by internet browser, the message "IP address rejected." is displayed.

The following table describes the applicable fields.

Table 12 IP Based Restriction Fields

Label	Description/Options
Allow IP's	<p>Enter individual IP Addresses or IP Address ranges, separated by commas. To specify a range, use a hyphen (-). Optional spaces improve readability.</p> <p>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.</p> <p>To allow all (except IP addresses in the deny list, if any), leave the field blank.</p> <p>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.</p>
Deny IP's	<p>Enter individual IP Addresses or IP Address ranges, separated by commas. To specify a range, use a hyphen (-). Optional spaces improve readability.</p> <p>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.</p> <p>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.</p>

IP restriction examples

Allow list with distinct IP addresses

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

For example if your system is accessible on your local area network (LAN) and you want to make sure only the CEO's specific desktop, laptop and tablet computers (with IP Addresses 192.168.1.50, 192.168.1.51, and 192.165.1.75, respectively) can connect to the broadcast, construct the following allow list:

Allow: 192.168.1.50, 192.168.1.51, 192.168.1.75

Allow list with a range of IP addresses

Sometimes you'll want a range of computer IP addresses to connect to your system. This may happen when you have one range of IP addresses assigned to desktop computers (i.e. in the range 192.168.1.1 to 192.168.1.100) and another range assigned to boardroom computers (i.e. the range 192.168.1.200 to 192.168.1.250). If you only want the boardroom computers to connect to broadcasts from the system you

can specify the range of boardroom IP addresses rather than needing to type in each individual address. The allow list looks as follows:

```
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.

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.

Allow list with a range of IP addresses, distinct IP addresses and an exception

Building on the previous examples, consider the situation where you want the CEO's computers (192.168.1.50, 192.168.1.51, 192.168.75) and all boardroom computers (192.168.1.200-192.168.1.250) to access the broadcast, with the exception of the public boardroom computer (192.168.1.211). Use both allow and deny lists to create the rule as follows:

Allow: 192.168.1.200-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75

Deny: 192.168.1.211

Both lists can have multiple ranges and multiple distinct IP addresses, provided they are separated by commas.

Deny list with a range of IP addresses

Converse to the previous examples, consider the situation where you want every computer on the network to access the broadcast, with the exception of the CEO's desktop, laptop and tablet computers. Additionally, boardroom computers should not be permitted with the exception of the cafeteria computer (IP address 192.168.1.222).

The deny list is an "exception" list for the allow list. So to craft the rule described above we need to allow all the computers in the local subnet, then deny specific sub-ranges including two groups of boardroom computers ensuring the cafeteria computer's IP address is not in the deny list:

Allow: 192.168.1.1-192.168.1.250

Deny: 192.168.1.200-192.168.1.221, 192.168.1.223-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75

Pearl's touch screen

Pearl's front panel includes a touch screen display used for confidence monitoring and basic configuration.

Use the touch screen to view system information, configure network settings, load configuration presets, view configured channels, review audio levels, and control channel recording.

By default, the screen and all its features are enabled. You can configure whether or not the touch screen is active and which features are enabled. See [Configure the touch screen](#).



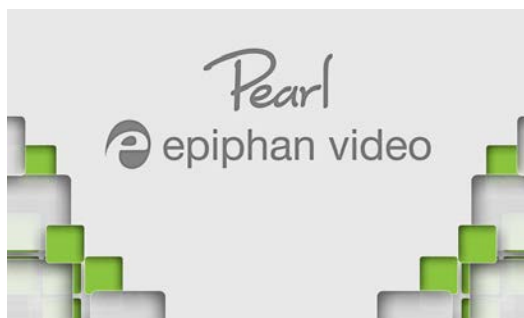
Pearl's touch screen is capacitive. Use your finger or a specially designed soft-tipped capacitive stylus with firm but gentle pressure. Pressing too hard or using something other than a fingertip or capacitive stylus can result in damage to the screen.

This section describes how to use the touch screen and provides an overview of the functionality available through the screen.

- [Touchscreen overview](#)
- [View system information](#)
- [Channel monitoring](#)
- [Pearl's audio jack](#)
- [Control recording](#)
- [Configure the touch screen](#)

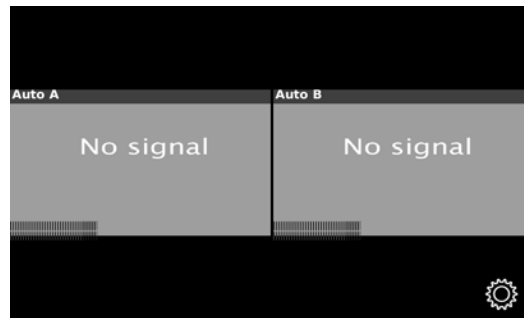
Touchscreen overview

While Pearl is booting, the following image appears on the touch screen (if the screen is enabled).

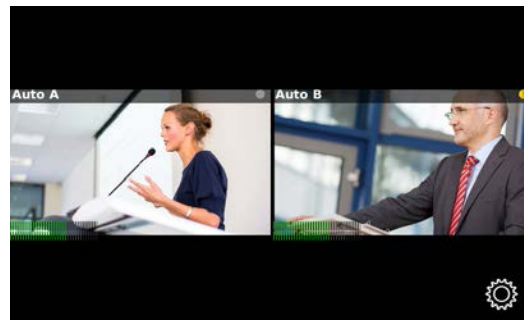


After boot up is complete, Pearl displays a grid view providing an overview of all configured channels.

If you have no sources plugged in, or if no plugged in source is sending a signal, the grid view shows the two auto channels with no signal (see [Use the automatic channels Auto A and Auto B](#) for more details on auto channels):



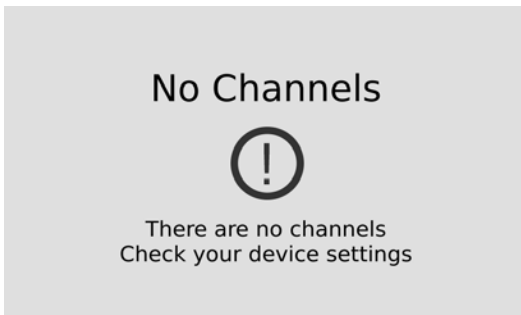
With sources plugged into at least one input of row A and row B, the grid view looks more like this:



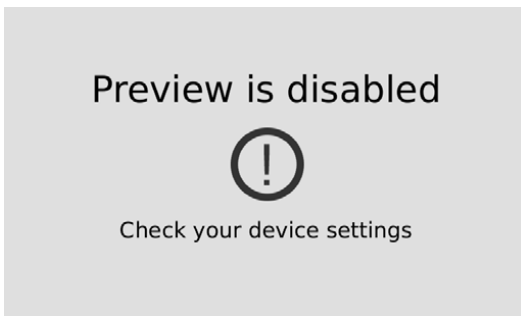
From this screen, touch either channel to go to the individual channel screen, or touch the **gear** symbol to go to the system settings screen. From the single channel screen touch the **gear** to go to system settings or touch the button with four squares to return to the grid.



If you delete the automatic channels **Auto A** or **Auto B**, and have no other channels configured, Pearl shows a no channels screen. Touch anywhere on this screen to go to the system settings screen.

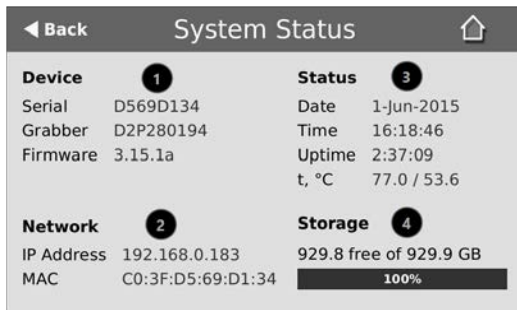


If the touch screen is configured not to show channel previews, the screen shows the following preview disabled message. Touch anywhere to on this screen to go to the system settings screen.



View system information

Useful when first setting up Pearl, for finding the system serial number or to check the installed firmware version, the touch screen shows you basic information about your Pearl. If desired, you can choose to disable this screen. See [Configure the touch screen](#).

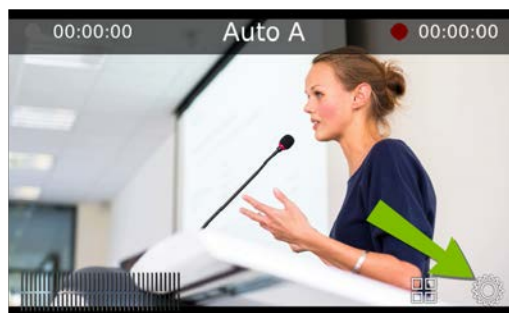


Label	Description
1	Device Information <ul style="list-style-type: none">Serial numbervideo grabber number

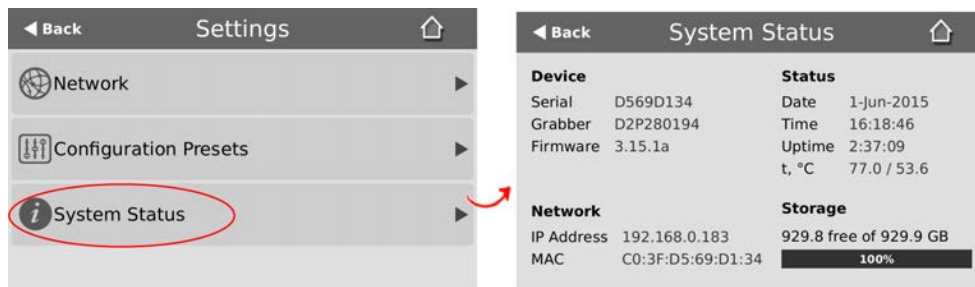
Label	Description
	<ul style="list-style-type: none"> Firmware version
<p>2</p>	<p>Network Information</p> <ul style="list-style-type: none"> IP Address MAC Address
<p>3</p>	<p>Device Status</p> <ul style="list-style-type: none"> System date System time Uptime Temperature in degrees Celsius
<p>4</p>	<p>Storage Information (when available)</p> <ul style="list-style-type: none"> Disk space available Pictogram of available disk space

To show system information on the touch screen:

1. If the system settings button (**gear**) is not on the screen, tap the screen once to turn on the control buttons.
2. 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.
3. Touch the system settings button (**gear**) on the screen.



4. Touch **System Status** to see the System Status page.



To close the system information screen:

1. Touch **Back** to return to the **System Settings** screen, or the **Home** icon to return to the channel view.

Channel monitoring

Use Pearl's front-panel screen to have complete confidence about what you're capturing. View audio levels and a preview of the captured video for each channel. Change between **individual channels** or view a **grid of all channels** using on-screen navigation buttons. You can also directly monitor audio quality using the 3.5 mm audio jack located at the front of the device. Read more about [Pearl's audio jack](#).

You may also be interested in learning about video switching from the touch screen, see [Live video mixing / switching](#).

Individual channel monitoring



Table 13 Parts of the touch screen in individual channel view

Item	Description
1	Channel name
2	Streaming status (grey means streaming is stopped, flashing blue means streaming is started)

Item	Description
3	Streaming timer (time since streaming was started)
4	Recording status (bright red and flashing means recording is started)
5	Recording timer (time since recording was started)
6	Switch to the previous channel
7	Switch to the next channel
8	Audio VU meter (see chart below for decibel ranges)
9	Grid view icon
10	System settings icon

To switch between available channels:

1. If necessary, tap the screen once to turn it on.
2. If necessary, tap the screen once to display controls on the channel view.
3. Touch the left or right controls on at the side of the channel display; the screen displays the next channel.

To change from grid view to an individual channel view:

1. If necessary, tap the screen once to turn it on.
2. Touch any channel in the grid view; the screen displays the selected channel.

Table 14 Touch screen audio VU meter levels








Color	Decibel range
Green	-60 dB to -10 dB
Yellow	-10 dB to -4 dB
Red	-4 dB to 0 dB

Grid-view channel monitoring

Depending on the number of configured channels, the grid view will show 2, 3, 4, 5 or 6 channels at once.



Table 15 Parts of the touch screen in grid view

Location	Description
Top left of channel	Channel name
Top right of channel	<p>Streaming (left) and recording (right) indicators:</p> <ul style="list-style-type: none"> (no dots) Streaming is disabled, and recording is stopped.  Streaming is stopped, recording is stopped.  Streaming is started, recording is stopped.  Streaming has an error, recording is stopped.  Streaming is stopped, recording is started.  Streaming and recording are both started.  Streaming has an error, recording is started.  Streaming is disabled, recording is started. <p>(Stop and start recording from the individual channel view.)</p>
Bottom left of channel	Audio level indicator. See Audio VU Meter for description of levels.
lower right corner of screen	Gear icon. Used to access settings.

To change from individual channel view to grid view:

1. If necessary, tap the screen once to turn it on.
2. If necessary, tap the screen once to display controls on the channel view.
3. Touch the grid view button; the screen displays the grid view

Pearl's audio jack

Pearl's front panel includes a 3.5 mm audio jack for audio monitoring.

Audio monitoring

To use the audio monitor, plug speakers or a microphone into the 3.5 mm audio jack.



Use the touch screen to select a channel, that channel's audio is played through the speakers or headphone. Audio is also played when switching layouts - and is always the audio for the currently live layout.

Mute audio monitoring

You can mute and unmute audio monitoring by touching the headphones icon on the touch screen.



Audio VU Meter

Regardless of whether or not speakers or headphones are plugged in, the touch screen also shows the audio levels on a VU meter. The VU meter shows the RMS level in dBFS (decibels relative to full scale) and uses colored bars to represent the current level.



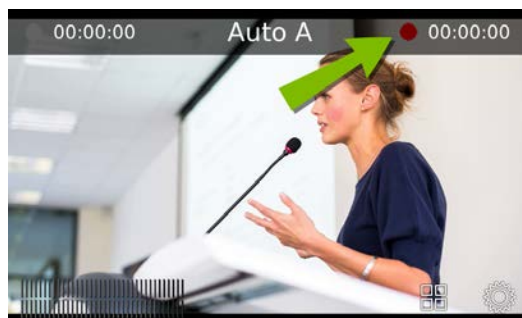
Table 16 Touch screen audio VU meter levels

Color	Decibel range
Green	-60 dB to -10 dB
Yellow	-10 dB to -4 dB
Red	-4 dB to 0 dB

Control recording

Pearl's touch screen gives you freedom to start and stop recording without needing to log in to the web interface.

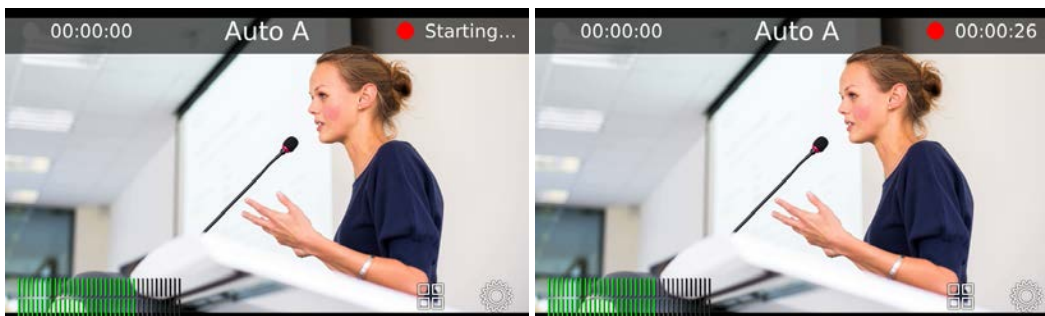
Simply scroll to the channel you wish to control and press the start or stop recording button.



To start recording:

1. If necessary, tap the screen once to turn it on.
2. If the grid view is showing, tap the channel for which you wish to control recording; the screen displays the channel.
3. If necessary, tap the screen once to display controls on the channel view.

4. Touch the red record button (see above) at the top right of the screen; recording starts and a timer is displayed to show the length of the recording.



To stop recording:

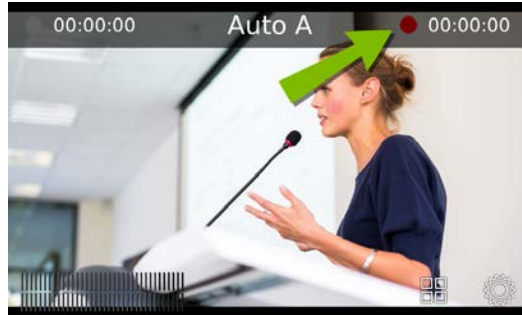
1. If necessary, tap the screen once to turn it on.
2. If the grid view is showing, tap the channel for which you wish to control recording; the screen displays the channel.
3. If necessary, tap the screen once to display controls on the channel view.
4. Touch the red record button (see above) at the top right of the screen; recording stops and the timer disappears.



Control streaming

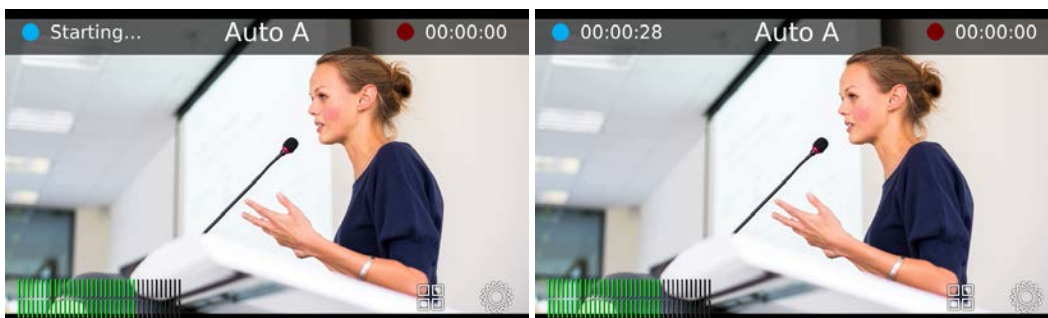
Pearl's touch screen gives you freedom to start and stop streaming without needing to log in to the web interface.

Simply scroll to the channel you wish to control and press the start or stop streaming button.



To start streaming:

1. If necessary, tap the screen once to turn it on.
2. If the grid view is showing, tap the channel for which you wish to control streaming; the screen displays the channel.
3. If necessary, tap the screen once to display controls on the channel view.
4. If there is no grey or blue streaming button at the top left corner of the screen, streaming is disabled. See [Stream to a CDN](#) to enable streaming.
5. Touch the grey streaming button (see above) at the top left of the screen; streaming starts and the timer begins to show the time elapsed since streaming started. (If an error occurs, a yellow circle with an exclamation mark will appear. Check your networking and streaming settings.)



To stop streaming:

1. If necessary, tap the screen once to turn it on.
2. If the grid view is showing, tap the channel for which you wish to control streaming; the screen displays the channel.
3. If necessary, tap the screen once to display controls on the channel view.
4. Touch the blue streaming button (see above) at the top left of the screen; streaming stops, the dot turns grey and the timer returns to zero.



Configure the touch screen


By default, Pearl's touch screen is enabled and all its features are available. Depending on your circumstances, you may wish to disable the screen, or disable just some of its features.

This section covers the following touch screen configuration items:

- [Disable \(or enable\) the touch screen](#)
- [Hide \(or show\) channel previews on the touch screen](#)
- [Disable \(or enable\) system status on the touch screen](#)
- [Block \(or allow\) configuration functions from the touch screen](#)
- [Block \(or allow\) recording, streaming and switching from the touch screen](#)
- [Set touch screen timeout](#)

Disable (or enable) the touch screen

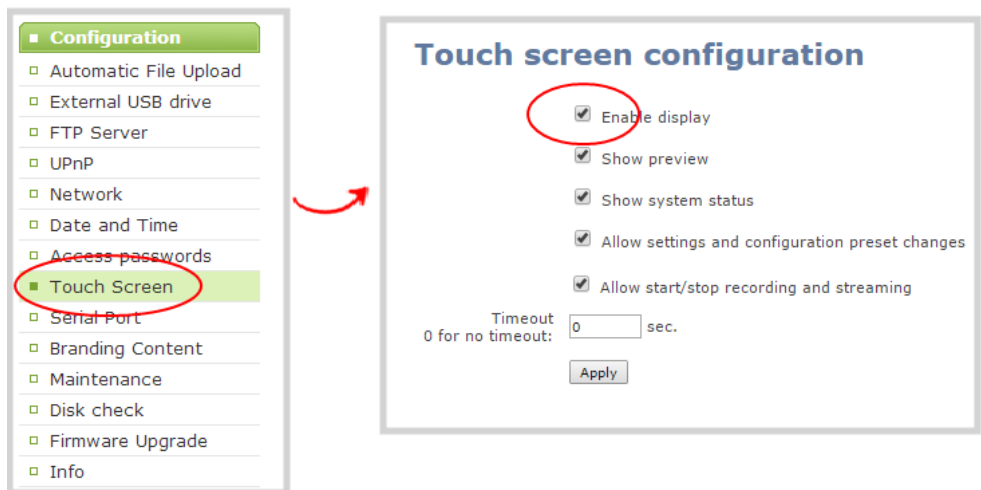
You can prevent Pearl from displaying anything on the touch screen, or you can re-instate this feature by toggling the **Enable display** configuration option.



The display is always touch-sensitive. This control indicates whether or not the display is on or off.

To disable (or enable) the touch screen display:

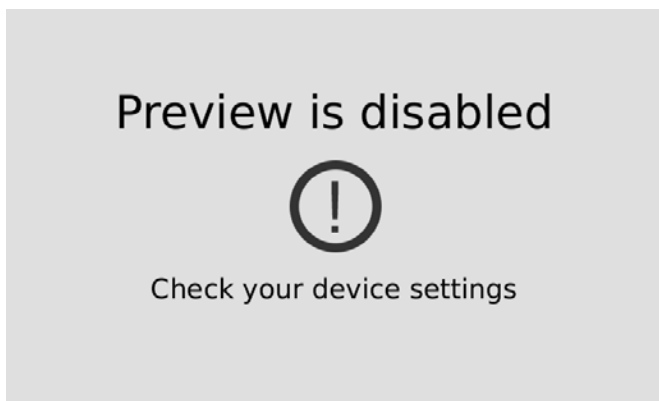
1. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
2. Login as admin.
3. Select the **Touch Screen** link in the Configuration menu; the touch screen configuration page opens.




- 4. Uncheck **Enable display** to disable the display (or check the box to enable the display).
- 5. Click **Apply**.

Hide (or show) channel previews on the touch screen

By default, Pearl shows previews of each configured channel. If this isn't suitable for your needs, you may disable channel preview. When channel previews are disabled, the touch screen shows the following image:

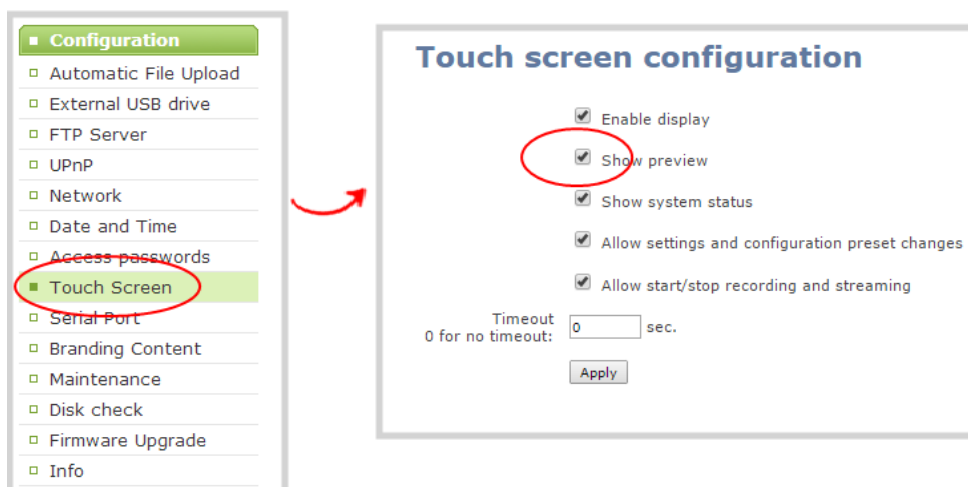


 While preview is disabled, if **system status** or **settings and configuration preset changes** are permitted, you can touch the screen anywhere to open the settings page.

To hide (or show) the channel previews on the touch screen:

- 1. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).

2. Login as admin.
3. Select the **Touch Screen** link in the Configuration menu; the touch screen configuration page opens.



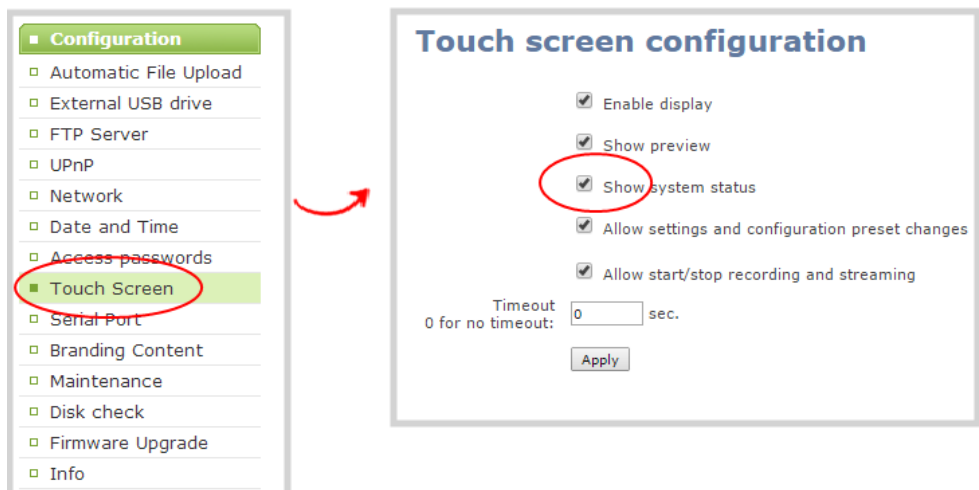
4. Uncheck **Show preview** to disable channel previews (or check the box to enable previews).
5. Click **Apply**.

Disable (or enable) system status on the touch screen

Once you've configured, Pearl it's possible you may no longer wish to show the system status screen on the touch screen. .

To hide (or show) system information on the touch screen:

1. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
2. Login as admin.
3. Select the **Touch Screen** link in the Configuration menu; the touch screen configuration page opens.



4. Uncheck **Show system status** to prevent the system status screen from being accessible on the touch screen (or check the box to enable system information).
5. Click **Apply**.

Block (or allow) configuration functions from the touch screen

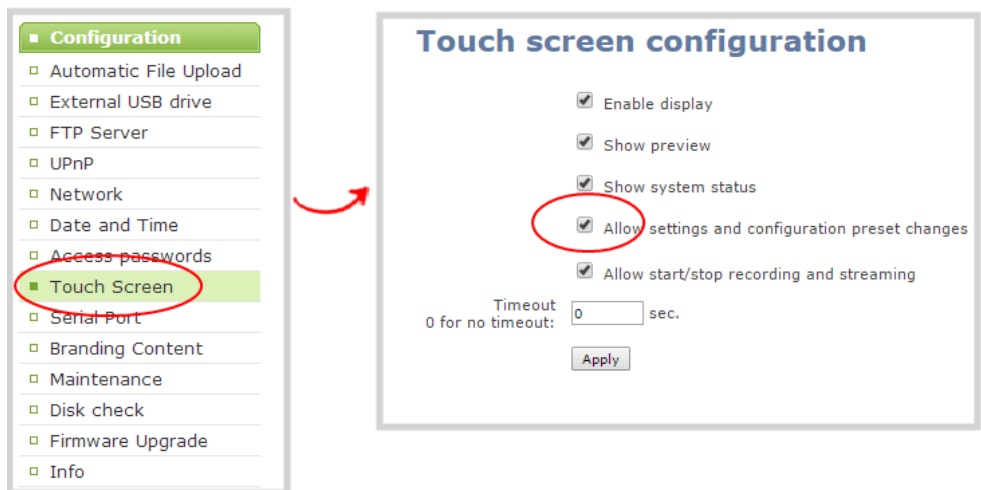
By default, Pearl permits applying configuration presets and configuring network settings via the touch screen. You can disable this ability.



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 block (or allow) the channel previews on the touch screen:

1. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
2. Login as admin.
3. Select the **Touch Screen** link in the Configuration menu; the touch screen configuration page opens.



4. Uncheck **Allow settings and configuration preset changes** to disable configuration from the touch screen (or check the box to enable configuration).
5. Click **Apply**.

Block (or allow) recording, streaming and switching from the touch screen

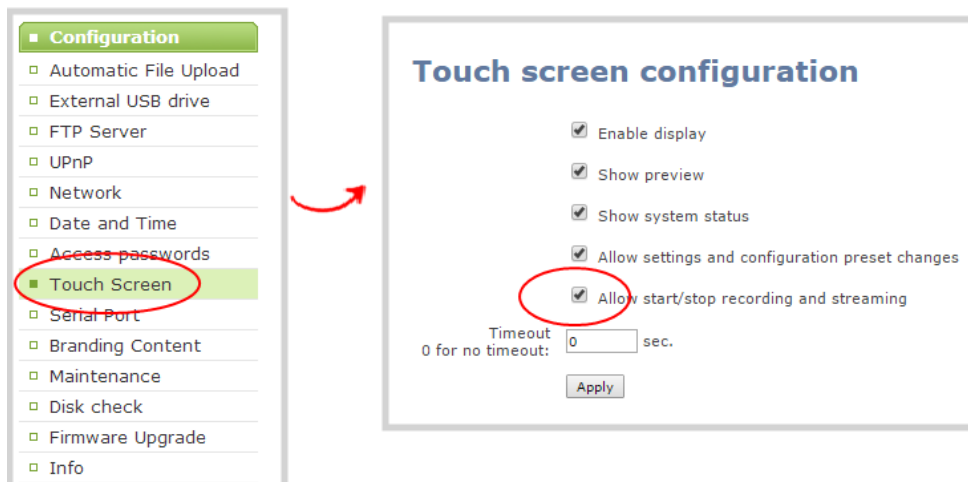
By default, Pearl permits recording, streaming and live switching control for channels. You can disable this control to prevent unwanted interruptions in streaming, gaps in recordings or to stop users from switching the layout used.



Channel preview must be on for recording, streaming and live switching control to work.

To block (or allow) the recording, streaming and live mixing / switching control via the touch screen:

1. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
2. Login as admin.
3. Select the **Touch Screen** link in the Configuration menu; the touch screen configuration page opens.



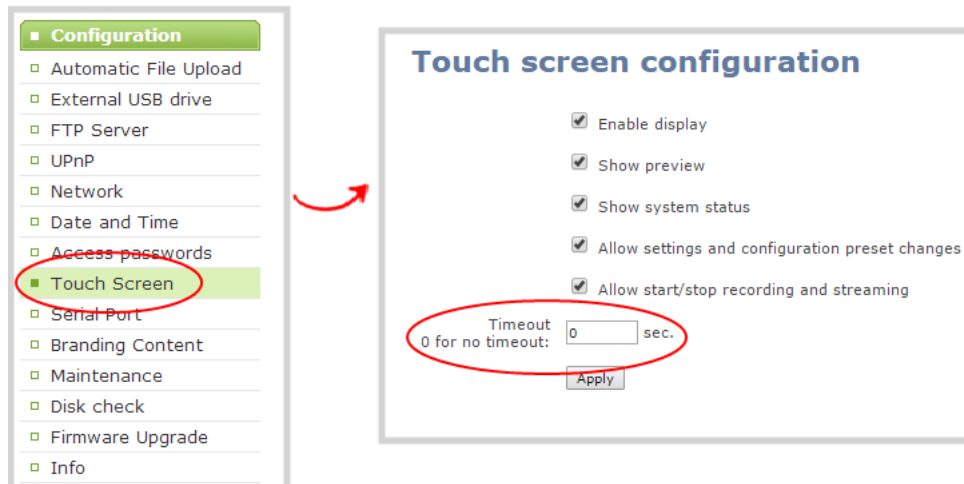
4. Uncheck **Allow start/stop recording and streaming** to disable recording, streaming and live switching control from the touch screen (or check the box to enable control).
5. Click **Apply**.

Set touch screen timeout

Initially, the touch screen is always on for easy monitoring. However, if you'd like, you can modify its configuration to cause it to shut off after a given amount of time. To re-enable it after timeout, simply touch anywhere on the screen.

To set a timeout for the touch screen:

1. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
2. Login as admin.
3. Select the **Touch Screen** link in the Configuration menu; the touch screen configuration page opens.



4. Enter a value in the **Timeout** field. The value is in seconds. Use 0 to keep the screen on whenever the system is on.
5. Click **Apply**.

View system information

The system information page provides a great deal of useful information about your Pearl. Use the Info link from the Configuration menu to view your current firmware level, system hardware version (if available) and currently configured channels.

To view system information:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, scroll to the Configuration menu option.
4. Click **Info**; the system information page opens.

Pearl D569D134 info

Firmware
 Version: 3.15.1b
 Revision: 31252_1743
 Date: 2015-06-11

Hardware
 CPU board: D53427RKE (G87790-405)

Channels

#	Channel name	Status	Video source	Audio source	Stream	Bitrate	Actual bitrate	Frame size	FPS / Actual FPS	Port
1	Auto_A	ok	Auto A	3 sources	H.264+AAC	auto	5558 kbps	1920x1080	30 / 30.0	8000 View
2	Auto_B	ok	Auto B	3 sources	H.264+AAC	auto	6905 kbps	1920x1080	30 / 30.0	8001 View
3	Channel_3	ok	2 sources	No sources	H.264+AAC	auto	6166 kbps	1920x1080	30 / 29.5	8002 View

Overall system load: 51%

3. Use the information displayed to get an overview of your system, troubleshoot problems or view streams for configured channels.

Configure network settings

By default Pearl uses DHCP to obtain an IP Address via an Ethernet-based network. If you want to change the network settings, or if you're having network-related issues, this section covers the network-related topics.

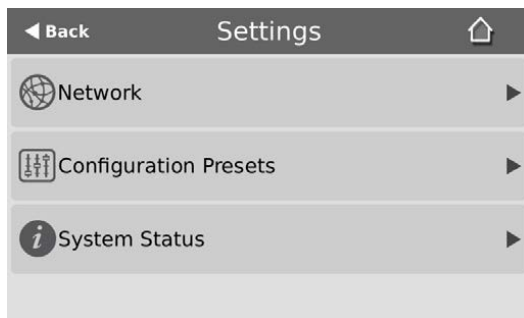
- [Verify IP Address and MAC address via the touch screen](#)
- [Verify IP address and MAC address via the web interface](#)
- [Configure a static IP address](#)
- [Configure DHCP](#)
- [Tether to a mobile network](#)
- [Perform network diagnostics](#)

Verify IP Address and MAC address via the touch screen

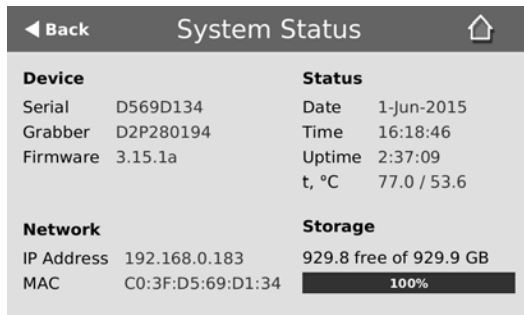
Pearl's touch screen interface, if enabled, can quickly and easily show you the system's IP Address and MAC address.

To show system information on the touch screen:

1. If the system settings button (**gears**) does not appear on the screen, tap the screen once to turn on the control buttons (from the "no channels" or "preview disabled" screen, this will go directly to the system settings screen).
2. If the system settings button (**gears**) is still not visible and an **i** icon is visible instead, configuration by touch screen is disabled in the system's settings. See [Configure the touch screen](#) to enable.
3. Touch the system settings button (**gears**) on the screen; the system settings screen appears.



4. Touch **System Status** to see the system information page.



To close the system information screen:

1. Touch **Back** to return to the Systems Settings screen or the **Home** icon to return to the channel view.

Verify IP address and MAC address via the web interface

The web interface shows you the system’s MAC address and current IP Address via the Network configuration page.

To view settings on network configuration page:

1. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
2. Login as admin.
3. Select the **Network** link in the Configuration menu; the network configuration page opens.
4. Note the **MAC address** and **Current IP address** listed at the top of the page.

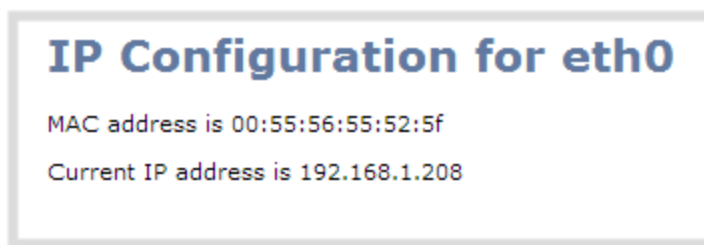


Table 17 Network Information Fields

Label	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

Label	Description/Options
	value is either obtained from the DHCP server (if using DHCP) or is the configured static IP address. Pearl supports IPv4 addresses. It does not support IPv6 addresses.

Configure DHCP

Occasionally, such as when moving your system to a new network, your Pearl must switch from static IP address allocation to dynamic allocation via DHCP. You can accomplish this in four ways:

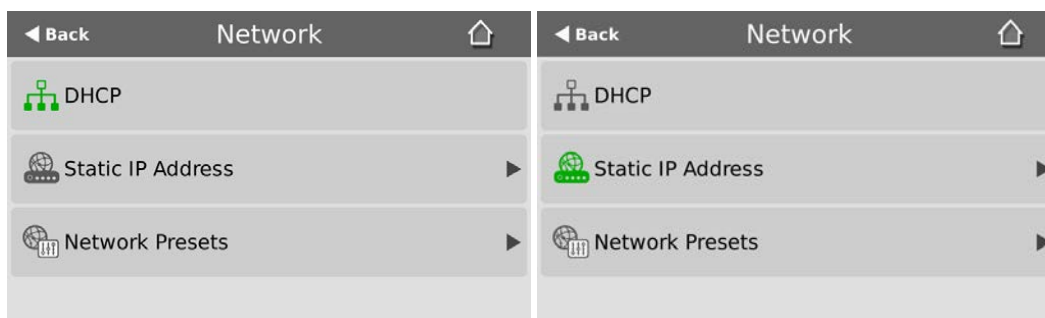
- Restore factory settings, clearing all your custom settings. See [Perform factory reset](#).
- Load a configuration preset file that uses DHCP networking. See [Apply a configuration preset from the web interface](#) or [Apply a configuration preset using the touch screen](#) .
- Change the network settings. See the procedure below.

For quick and easy setup of Pearl, you can configure network settings via the web interface or via touch screen.

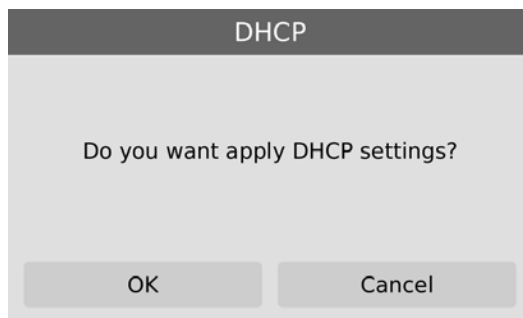
Using the touch screen, you can choose to apply a configuration presets that uses DHCP (see [Configuration presets](#))

To configure network settings via the touch screen:

1. If the system settings button (**gears**) does not appear on the screen, tap the screen once to turn on the control buttons (from the "no channels" or "preview disabled" screen, this will go directly to the system settings screen).
2. If the system settings button (**gears**) is still not visible and an **i** icon is visible instead, configuration by touch screen is disabled in the system's settings. See [Configure the touch screen](#) to enable.
3. Touch the system settings button (**gears**) on the screen; the system settings screen appears.
4. Touch **Network** ; the Network settings page appears. The currently enabled type of network setting (DHCP or static) is highlighted green.



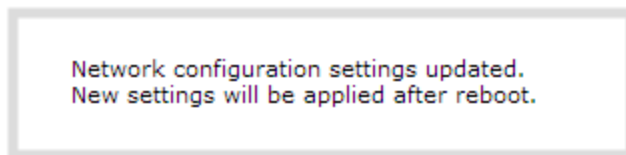
5. If not already using DHCP, touch **DHCP** to enable DHCP.
6. If DHCP was not the active network type, a confirmation message is displayed.



7. Touch **OK**; DHCP is enabled.

To configure use of DHCP for networking:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Network** link in the Configuration menu; the network configuration page opens.
3. Select the radio button **use DHCP**, if not already selected.
4. Change the **MTU Size** value only if needed. See the table below for information on maximum transmission unit (MTU) values.
5. Click **Apply** to save the changes; the changes are saved and a message appears asking you to reboot.



6. Select the **Maintenance** link under the Configuration menu; the maintenance page appears.
7. Click the **Reboot Now** button near the bottom of the page.
8. Wait for the system to reboot.
9. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
10. Log as admin and reload the Networking page to verify all changes were applied.

The following table describes the fields applicable when configuring DHCP on Pearl.

Table 18 DHCP Fields

Label	Description/Options
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.
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 if all nodes in your network use the same value, so only change this value if you know other nodes use a different value.

Configure a static IP address

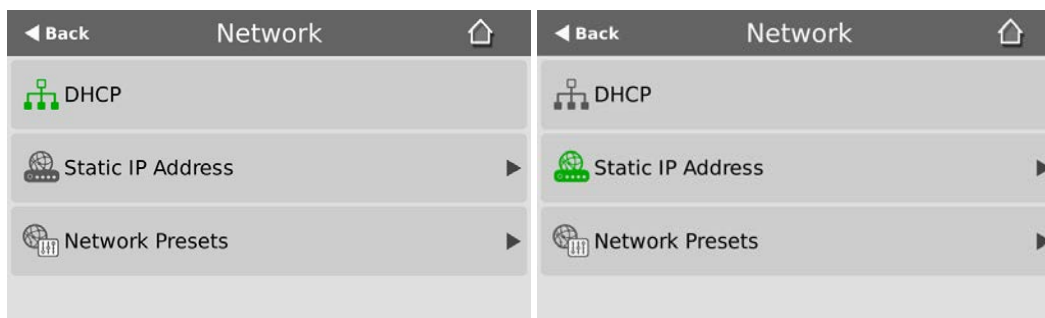
Your network administrator may require you to use a static IP address for your Pearl.

For quick and easy setup of Pearl, you can configure network settings via the web interface or via touch screen.

Using the touch screen, you can choose to apply a configuration presets that contains a static network IP (see [Configuration presets](#))

To configure network settings via the touch screen:

1. If the system settings button (**gears**) does not appear on the screen, tap the screen once to turn on the control buttons (from the "no channels" or "preview disabled" screen, this will go directly to the system settings screen).
2. If the system settings button (**gears**) is still not visible and an **i** icon is visible instead, configuration by touch screen is disabled in the system's settings. See [Configure the touch screen](#) to enable.
3. Touch the system settings button (**gears**) on the screen; the system settings screen appears.
4. Touch **Network** ; the network settings page appears. The currently enabled type of network setting (DHCP or static) is highlighted green.




5. Touch **Static IP Address** to configure a static IP address; the static IP configuration page appears.

◀ Back	Static IP Address	Apply
IP Address	192 . 168 . 10 . 1	7 8 9
Network Mask	255 . 255 . 255 . 0	4 5 6
Default Gateway	0 . 0 . 0 . 0	1 2 3
DNS Server	0 . 0 . 0 . 0	< 0 .

6. Touch an **IP Address** section (e.g. 192) and type a new value using the keypad.
7. Repeat for all fields in the **IP Address** and **Network Mask**.

 Only IPv4 addresses are supported.

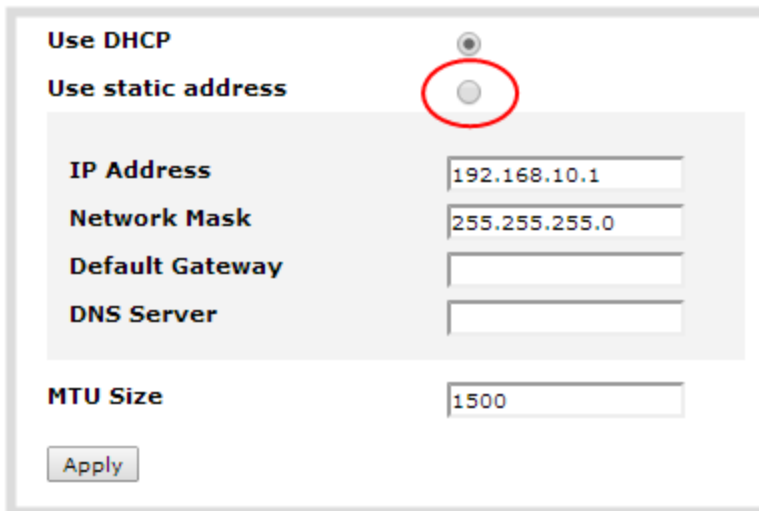
8. Enter the **Default Gateway** address. If you do not have a default gateway for your network, enter the same static IP address as in the previous step.

 The default gateway cannot be left blank. If no default gateway is specified, unexpected behavior occurs.

9. Enter the **DNS Server** address. If you do not have a DNS server, enter the new static IP address of the system.
10. Touch **Apply** to apply the changes.

To configure a static IP address via the web interface:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Network** link in the Configuration menu; the network configuration page opens.



The screenshot shows a network configuration window. At the top, there are two radio buttons: "Use DHCP" (unselected) and "Use static address" (selected and circled in red). Below the radio buttons, there are input fields for "IP Address" (192.168.10.1), "Network Mask" (255.255.255.0), "Default Gateway", "DNS Server", and "MTU Size" (1500). An "Apply" button is located at the bottom left of the form.

3. Select the radio button **use static address**, if not already selected.
4. Enter the desired **IP Address** and **Network Mask**.



Only IPv4 addresses are supported.

5. Enter the **Default Gateway** address. If you do not have a default gateway for your network, enter the same static IP address as in the previous step.



The default gateway cannot be left blank. If no default gateway is specified, unexpected behavior occurs.

6. Enter the **DNS Server** address. If you do not have a DNS server, enter the new static IP address of the system.
7. Change the **MTU Size** value only if needed. See the table below for information on maximum transmission unit (MTU) values.
8. Click **Apply** to save the changes; the changes are saved and a message appears asking you to reboot.

Network configuration settings updated.
New settings will be applied after reboot.

9. Select the **Maintenance** link under the Configuration menu; the maintenance page appears.
10. Click the **Reboot Now** button near the bottom of the page.

11. Wait for the system to reboot.
12. Open the Web interface using the new IP address.
13. Log as admin and reload the **Networking** page to verify all changes were applied.

The following table describes applicable fields when setting a static IP address.

Table 19 Static IP Address Fields

Label	Description/Options
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. This value is may be obtained from your system administrator. Pearl supports IPv4 addresses. It does not support IPv6 addresses.
Network Mask	Also called the subnet mask, this value denotes a range of IP addresses. This value may be obtained from your system administrator, determined from another computer on the same subnet, or calculated 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 if all nodes in your network use the same value, so only change this value if you know other nodes use a different value.

Tether to a mobile network

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



When the system falls over to the backup network type (i.e. from Ethernet to mobile, or vice versa) all streaming sessions with clients or servers directly connected to the system are closed and the clients will need to reconnect. You may need to provide a new stream URL (containing the new IP address) to your viewers. See the channel information page to get the new stream URL.

By contrast, actively published streams are closed and reconnected via the secondary network (mobile or Ethernet) automatically, permitted the required publishing server is accessible from the new network.

To configure tethering to a mobile network:

1. Configure the mobile device to allow tethering via USB.
2. Connect the mobile device to Pearl with a USB cable.
3. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
4. Login as admin.
5. Select the **Network** link in the Configuration menu; the network configuration page opens.
6. Click the drop-down box next to **Use phone/tablet connection** in the USB phone/tablet section; the following choices appear:


Table 20 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.

7. Select your choice based on the table above.
8. Click **Apply**.

Perform network diagnostics

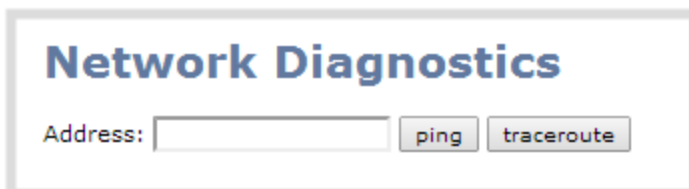
If your Pearl has network trouble, you can perform basic network troubleshooting tasks from the Network configuration page. In addition to providing the system’s IP address and MAC address to your network administrator, you can also ping an IP address or use traceroute to determine the path taken to an address.



Not all networks support ping and traceroute.

To ping or traceroute an IP address:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Network** link in the Configuration menu; the network configuration page opens.



3. Click **ping** or **traceroute**; an animation appears to the left of the address to indicate processing is underway.
4. Upon completion of the command, read the results from the console-like display is shown below the Network Diagnostics setting.

Network Diagnostics

Address:

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

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

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

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

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

=

--- 192.168.1.104 ping statistics ---

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

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

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 or when you are managing a number of systems and you want them to have similar configurations.

For an overview of configuration presets, see:

- [Configuration presets overview](#)

This section also covers the following related topics:

- [Configuration groups](#)
- [Create a configuration preset](#)
- [Apply a configuration preset from the web interface](#)
- [Apply a configuration preset using the touch screen](#)
- [Apply the Factory default configuration preset](#)
- [Update a configuration preset](#)
- [Delete a configuration preset](#)

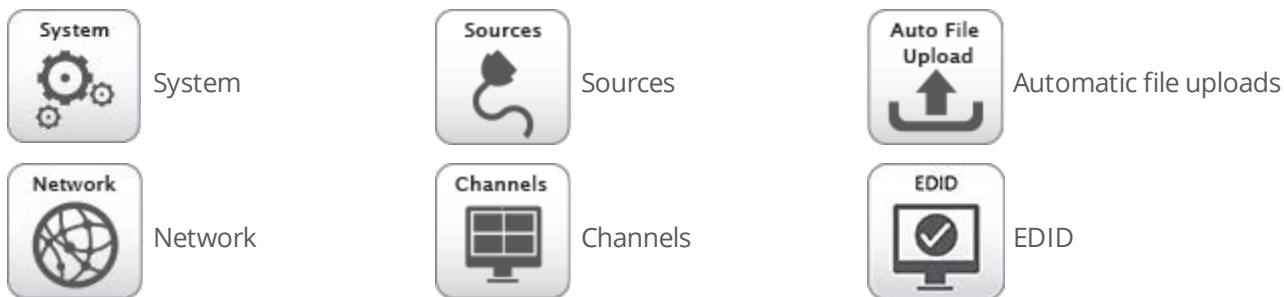
There are also some very important configuration preset considerations to review:

- [Configuration preset considerations](#)

Configuration presets overview

Configuration presets make it easy to manage a group of Pearl systems or to use your Pearl in a variety of situations without needing to reconfigure it.

Configuration presets divide the system's settings into the following configuration groups. (For a complete list of what is included in each group see [Configuration presets overview](#).)





Output ports



Touch screen

Using the **Configuration presets** section of the **Maintenance** page, you can create and save configuration presets using any number and combination of the configuration groups. Mix and match the settings groups saved together to create sets of configuration settings needed for each situation. You also always have a special **Factory default** configuration preset (which cannot be erased) to help you return to factory configuration without destructively erasing files saved to the system hard drive (see [Configuration presets overview](#))

When you are satisfied with the set of configuration items, you can save it, apply it again at a later date and even download it, then log into another Pearl system and apply it there. You can also apply already uploaded configuration presets through the touch screen.

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 presets overview](#) section carefully to understand caveats around using configuration presets.

Configuration presets in action

Here's an example of how configuration presets can make it easy to manage a fleet of systems.

Imagine a company is hired to do the following tasks at a big conference:


- Stream and record each conference session with a picture in picture layout that includes identifying information about the presenter in the metadata and the background image for the stream.
- Stream and record the keynote with pre-show content, post-show content and live switching between a number of different layouts during the show.
- Automatically upload backups of the keynote and session recordings.

The company will meet these goals with a fleet of Pearl systems.

Before the show, they upload the required backgrounds and create channel configuration presets for the keynote and each conference track. Each of these is saved as a named preset (for example Keynote, Session 1, Session 2) with all the pieces needed for that session, including the background image(s), metadata, streaming settings, etc.

They also create network and automatic file upload (AFU) presets for each of the home and remote locations.

Once at the conference, they upload these configuration files to the fleet of systems and apply the network and AFU preset. Before each conference session they need only apply the appropriate preset to configure the system correctly for the session. Note that once the presets are loaded on the system you can apply them via the touch screen!

 Channel configuration includes background and other image files used. 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.

Let's take a closer look at the types of presets they make:

Internal network and AFU preset

The company uses this preset when configuring and testing from their corporate network. It uses a static IP address on their corporate network and AFU that uses ftp to upload to a local ftp server.



The internal network preset

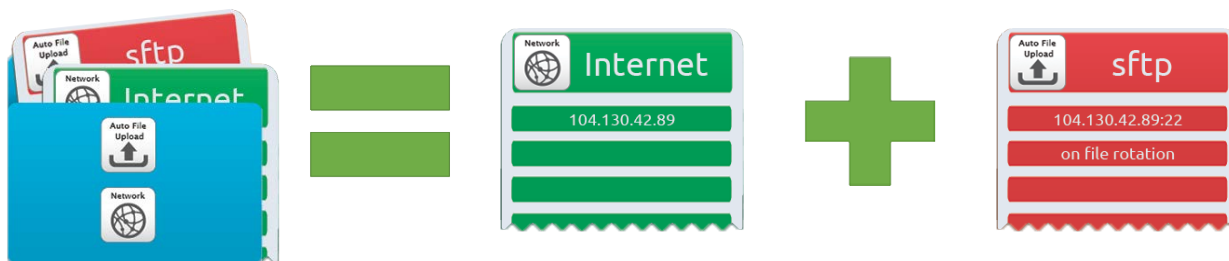
is comprised of the internal network settings

and ftp settings on the internal network.

Conference network and AFU preset

The company applies this preset to Pearl systems when they arrive at the conference. It changes only the network and AFU settings (using a conference-specific IP address and secure file transfer to an ftp server).

When applying this configuration preset, all other information including passwords, date/time, channels and source configurations, remains the same.



The conference network preset

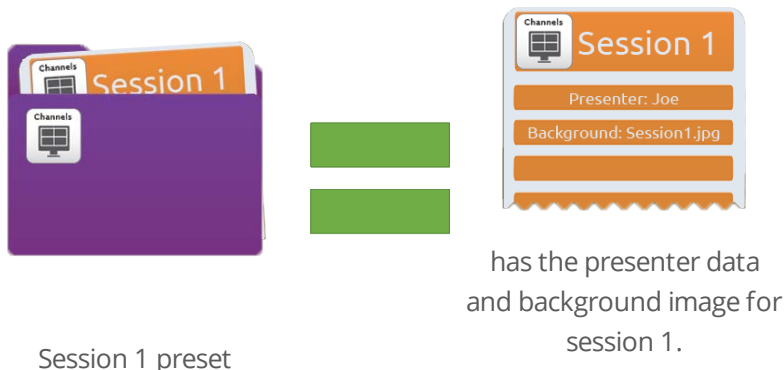
is comprised of the conference IP address

and an ftp address on the conference network.

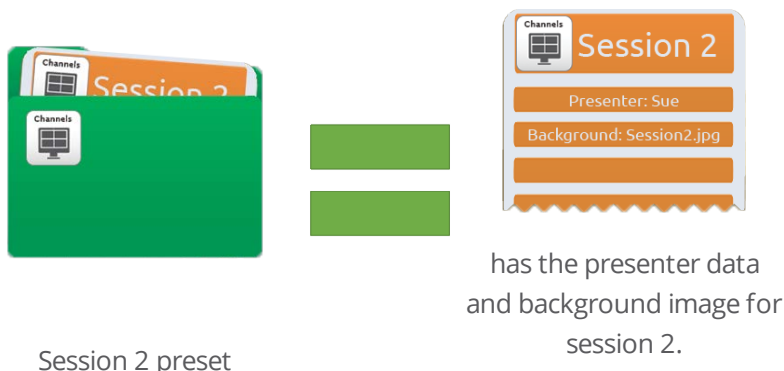
Conference breakout session and keynote presets

The company creates one preset per session and one for the keynote. Each preset includes all the files and everything needed to recreate a custom channel configured with the layouts and backgrounds needed for the session.

They upload these presets at the beginning of the conference and apply the correct one prior to each conference session starting. When they apply the preset, all other preset groups remain unchanged; the preset only affects the channel(s) and their configuration. This preset includes a channel the background file and has metadata specifying the speaker's name.



Session 1 preset



Session 2 preset

Note that after applying a preset, files from the previous session remain present on the system and continue to upload via sftp (if not yet complete), but the channels reflect the newly loaded session's background file name and presenter name.









Summary


Configuration presets are a versatile tool to help you use Pearl in a variety of conditions. Try it yourself and see!

Configuration groups

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

Table 21 Configuration group definitions

Group Name	Symbol	Settings included in the configuration group
System		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.
Sources		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, including SCP/SFTP identity (stored in an encrypted form).
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.

 Note that SFTP/SCP **private keys** are included (in encrypted format) in the automatic file upload preset.

Create a configuration preset

You can create as many configuration presets as you need, however there is a limit to the amount of space you have for configuration presets (256 MB). For each configuration preset you create, you get to name the preset and choose the groups of setting types to include. See [Configuration groups](#) for more information about the groups of configuration items.

It's good practice, after completing configuration of your Pearl, to save a full backup (with all groups selected) so you may restore it at a later date (i.e. after a change that wasn't wanted or after a factory reset).



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

To create a configuration preset:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.
3. Scroll to the **Configuration presets** section.

4. Type a description for your preset in the **Name** field.
5. Ensure only the desired configuration groups are selected from the **Sections** group. (For full system backup, select all groups.)
6. 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, you'll see an error. You'll be unable to save the preset until the missing files are restored or the layouts referencing the files are changed to remove the references.



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



There is a maximum amount of 256 MB available to save configuration presets and a maximum size of 128 MB for a single configuration preset.

Export and import configuration presets

After creating your configuration presets (see [Create a configuration preset](#)), you can download the file to your local computer. You can then choose to upload and apply this preset to other Pearl systems or you can store the preset as an offline backup of your current configuration.

Either way, it is a simple two-step process to download the preset from one system and upload it to another.

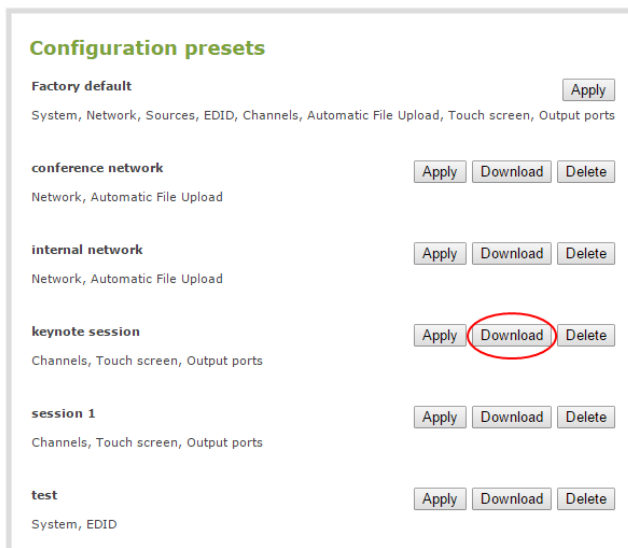


Uploading a preset does not apply immediately. You must still apply the preset using **Apply a configuration preset using the touch screen** or **Apply a configuration preset using the touch screen**.

Download a configuration preset

To download or export a configuration preset:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.
3. Scroll to the **Configuration presets** section.
4. Click the **Download** button next to the configuration preset you wish to export.

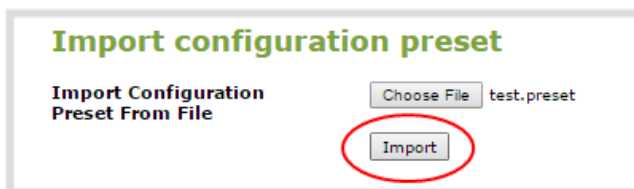


5. The configuration preset file (with extension .preset) is saved to your admin workstation (in your browser's download folder).

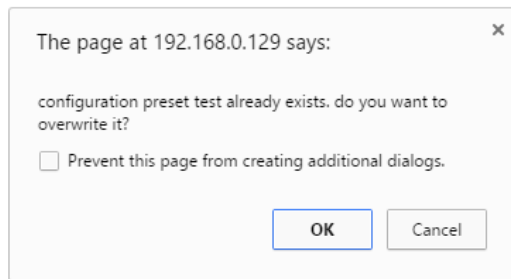
Import a configuration preset

To import a configuration a preset:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.
3. Scroll to the **Import configuration preset** section.
4. Click the **Choose file** button; a file picker window opens.
5. Select the file you wish to upload (with the extension .preset) and click **OK**.
6. Click **Import**.



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



8. If the process is not canceled, the configuration preset file is uploaded (but not applied).
9. If desired, apply the configuration preset. See [Apply a configuration preset from the web interface](#) or [Apply a configuration preset using the touch screen](#).

Apply a configuration preset from the web interface

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.

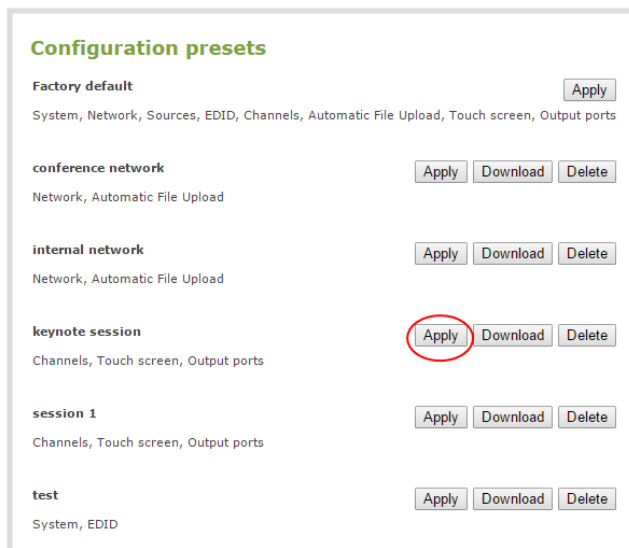
You can verify which configuration groups are included in a preset by looking at the list to the right of the configuration preset name. The term 'all' means all groups are included. Otherwise groups are listed individually.



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.

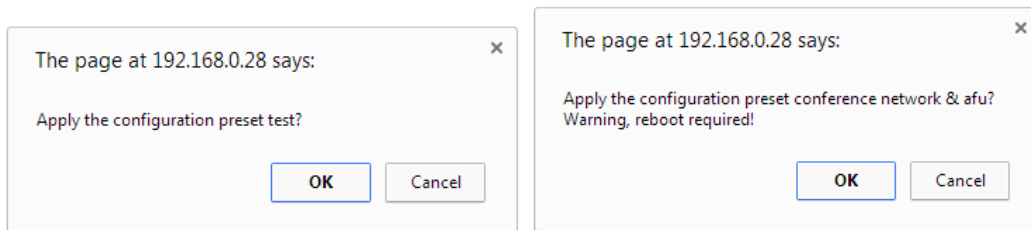
To apply a configuration preset from the web interface:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.
3. Scroll to the **Configuration presets** section.
4. Click the **Apply** button next to the configuration preset you wish to apply.



5. The system asks for confirmation before proceeding.

If the configuration preset includes the **network** or **system** configuration groups, a reboot is necessary.



6. Click **OK** to apply the configuration preset; the configuration preset is applied.

7. The system reboots if needed.

Apply a configuration preset using the touch screen

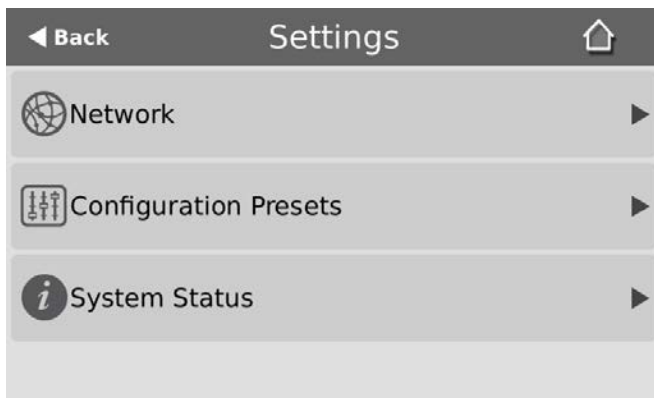
You can use Pearl's touch screen to apply configuration presets.

For configuration presets that only contain the **network** configuration group you can use either of the two methods described below. For all other configuration presets, use the first method.

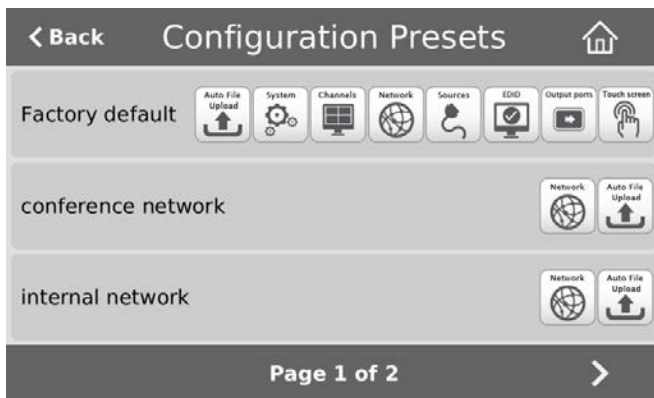
If you apply a preset that has the EDID configuration group, the system may appear unresponsive for a short time while it applies these EDIDs to the video grabbers.

To apply a configuration preset via the touch screen:

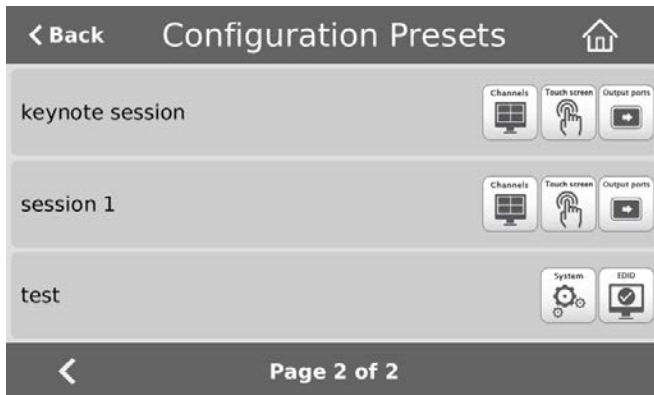
1. If necessary, tap the screen once to turn it on or to turn on the screen overlay.
2. If the system settings button (**gear**) is still not visible and an **i** icon is visible instead, configuration by touch screen is disabled in the system's settings. See [Configure the touch screen](#) to enable.
3. Touch the gear icon at the bottom right of the screen; the settings page appears.




4. Touch **Configuration Presets**; an alphabetically sorted list of saved presets is presented (Factory default is always listed first). Each preset shows the included preset configuration groups via a list of icons to the right of the preset name.

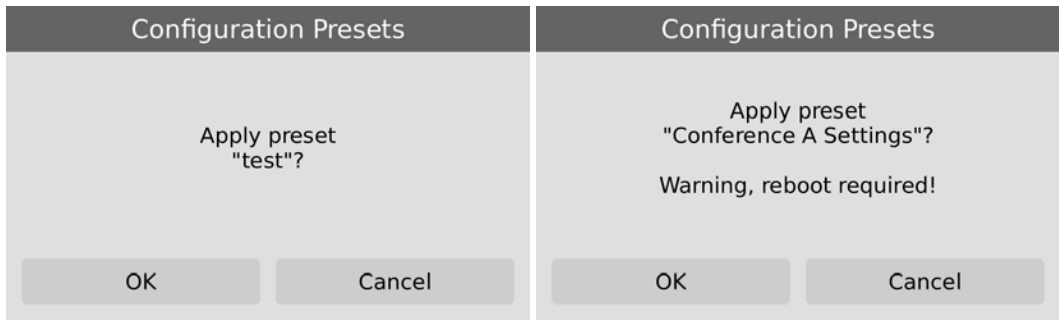


5. If necessary touch the arrows at the bottom of the page to navigate to the desired preset.



6. Touch the name of the preset you wish to apply.
7. A confirmation message is displayed.

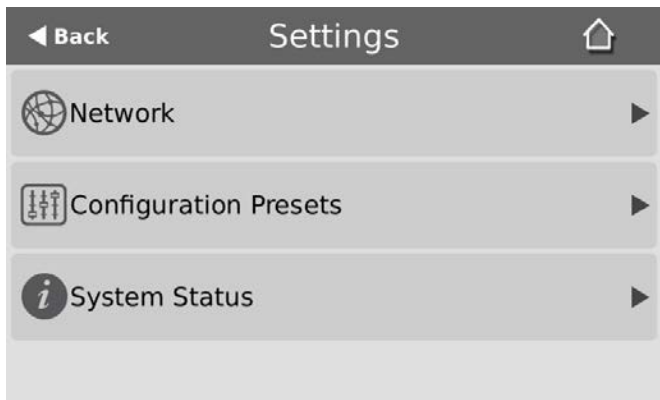
 If the configuration preset includes the **network** or **system** configuration groups, a reboot is necessary.



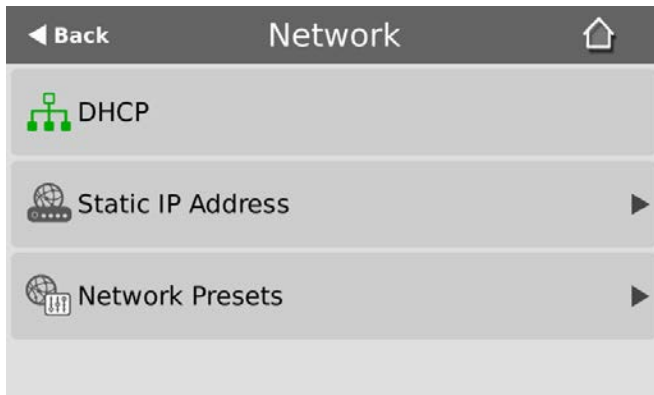
8. Click **OK** to apply the preset; the configuration preset is applied.
9. The system reboots, if required.

To apply a configuration preset that contains only the network configuration group you may use this process:

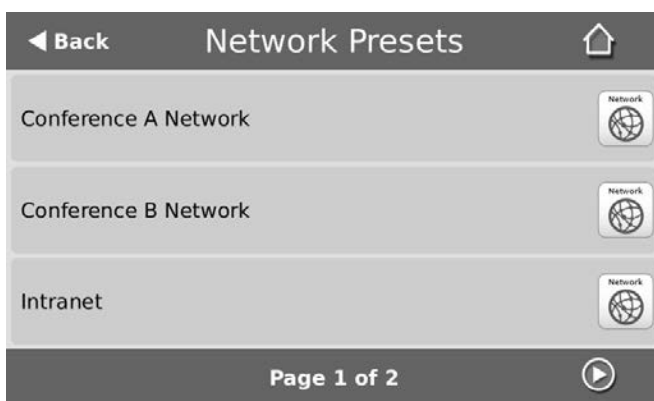
1. If necessary, tap the screen once to turn it on or to turn on the screen overlay.
2. Touch the gear icon at the bottom right of the screen; the settings page appears.



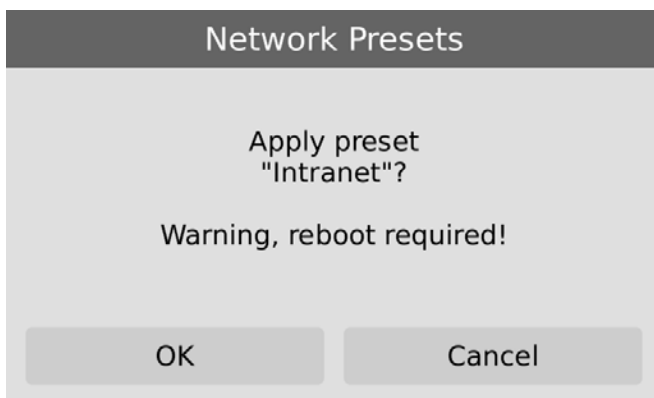
3. Touch the **Network** line; the network configuration page opens.



4. Touch **Network Presets**; a list of saved configuration settings with only Network settings opens.



5. Touch the name of the preset you wish to apply; a confirmation message is displayed.



6. Click **OK** to apply the network configuration preset and reboot the system.

Apply the **Factory default** configuration preset

Your Pearl comes with a special factory default configuration preset. This configuration preset cannot be erased and is always presented at the top of the configuration presets list. It contains all six possible

configuration settings groups.

Using the Factory default configuration setting is similar to using the Factory reset method (see [Perform factory reset](#)) with a few important differences.

In short, the **Factory default** configuration preset is less destructive than **Factory reset**. This table describes the exact differences.

Table 22 *Factory default configuration preset vs Factory reset*

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

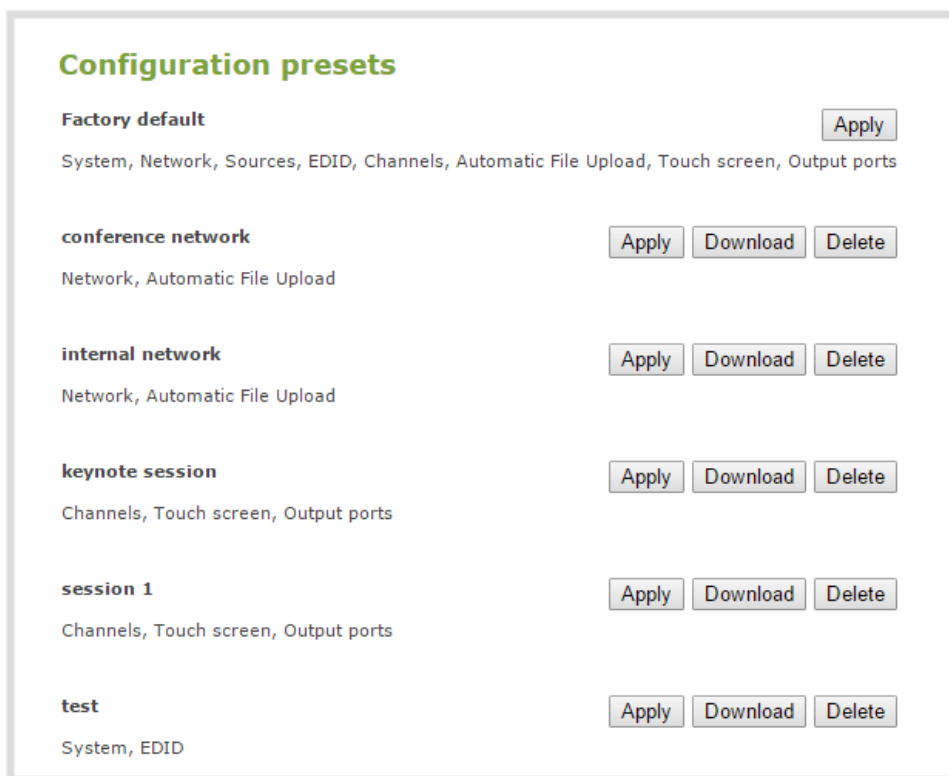
To apply the factory default configuration preset, follow the instructions in [Apply the Factory default configuration preset](#) or [Apply the Factory default configuration preset](#) and select the **Factory default** preset. A reboot is required.

Update a configuration preset

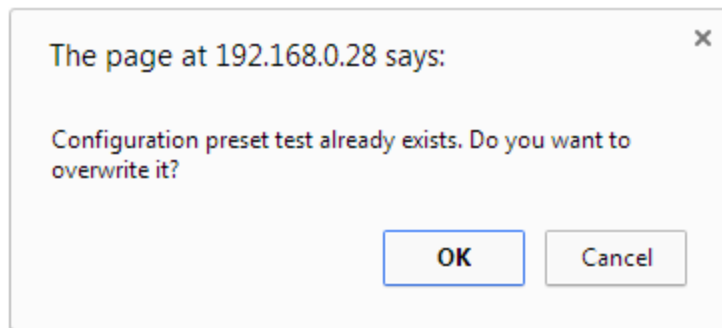
If you need to update a configuration preset to include different configuration groups, or simply new settings for the same groups, you can do so easily via the web interface.

To update a configuration preset:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.
3. Scroll to the **Configuration presets** section.



4. Find the preset you wish to change from the presets list.
5. Copy the name of the preset into the **Name** field.
6. Selected the desired configuration group(s) from the **Sections** group.
7. Click **Save**; a confirmation dialog asks you to confirm you want to overwrite the configuration preset.



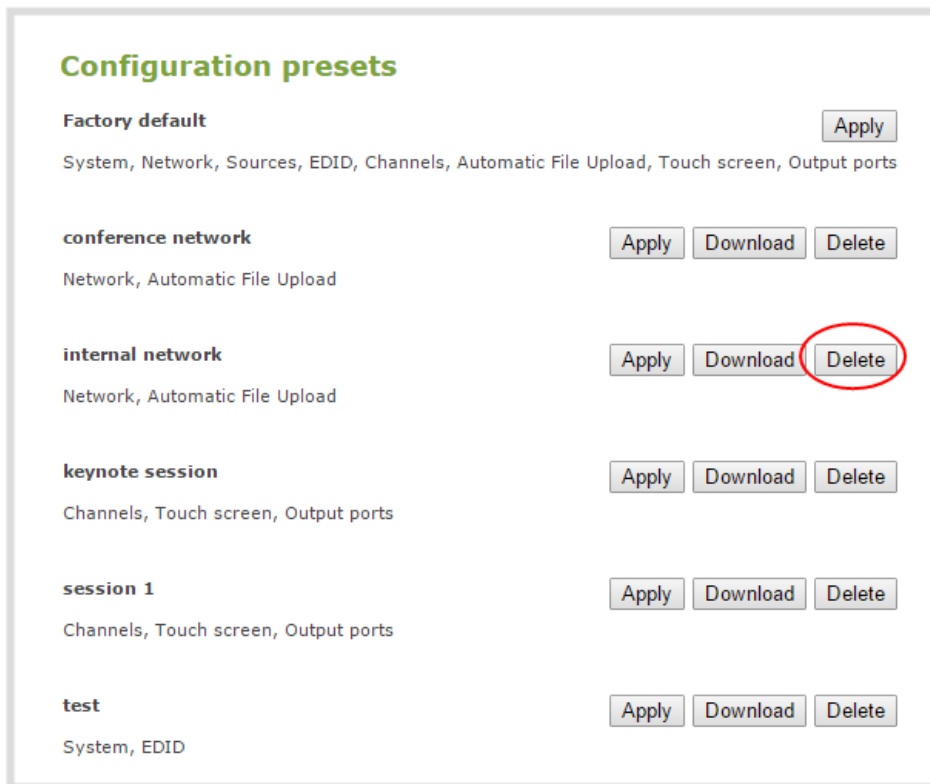
8. Click OK; your configuration preset is updated in the list.

Delete a configuration preset

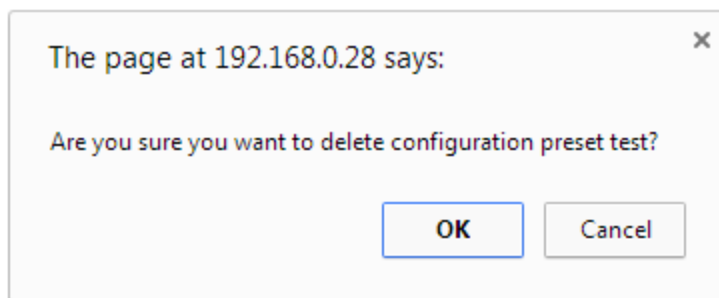
You may want to trim the list of configuration presets to only those that are needed for your ongoing needs. You can delete all configuration presets at once by doing a factory reset, or you can delete individual configuration presets from the **Maintenance** page.

To delete a configuration preset:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.
3. Scroll to the **Configuration presets** section.



4. Click the **Delete** button for the configuration preset; a confirmation message appears.



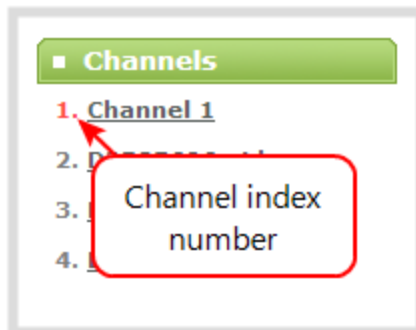
5. Click **OK** to confirm you want to delete the preset; the preset is deleted.

Configuration preset considerations

Configuration presets are groups of settings applied to the system, leaving other settings intact. The following considerations will help you get the most from your configuration presets.

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 web interface:



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 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 states](#), [Recorded files \(in channels and recorders\)](#) and [Deleting channels](#) 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 web interface. 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.

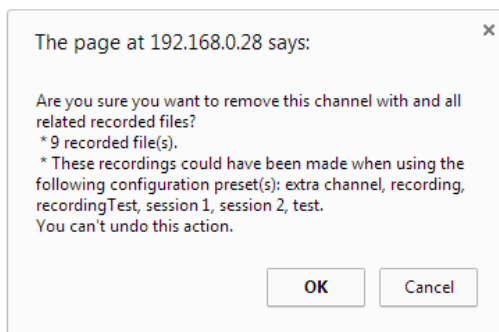
Deleting channels

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 web interface 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.



Branding content

Branding content files (logos, background images, etc) are included in your configuration presets and must be present on the system when creating a preset that includes the **Channels** group, otherwise a failure is reported.

Configuration presets are not user profiles

Configuration presets should not be confused with the concept of user profiles. Specifically, the following issues arise from trying to use configuration presets as user profiles:

- recorded files are not removed between application of configuration presets (*users could see each other's files*)
- configuration presets can be overwritten and deleted with no password (*users could affect each other's presets*)
- branding and recorded files can be deleted, affecting more than just the currently applied configuration presets (*users could erase branding or recordings belonging to other users*)
- applying a configuration presets does not clear the settings from groups not part of the preset (*user information is not private*)

Touch screen considerations

The **touch screen** configuration group includes all the security settings for the touch screen. One such setting is the ability to use the touch screen. It is therefore possible to apply a preset via the touch screen that effectively locks out any further use of the touch screen. If this happens accidentally, use the web interface to re-enable the touch screen (see [Configure the touch screen](#)).

Configure date and time

Pearl 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 interface lets you specify date and time settings to ensure they are correctly configured for your time zone and your network.

This section covers the following date and time-related topics:

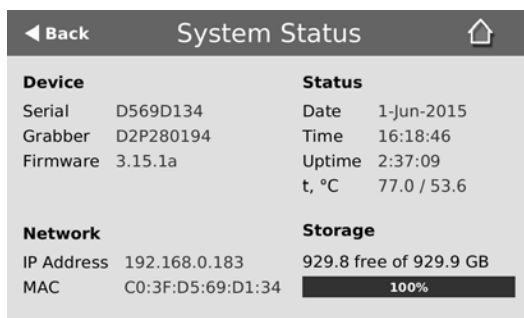
- [Verify date and time via the touch screen](#)
- [Verify date and time settings](#)
- [Change the time zone](#)
- [Configure synchronized time \(NTP, PTP v1 and RDATE\)](#)
- [Configure a local NTP server](#)
- [Configure the date and time manually](#)

Verify date and time via the touch screen

Pearl's touch screen interface, if enabled, can quickly and easily show you the system's date and time settings.

To show system information (including date and time) on the touch screen:

1. If the system information button (*i*) does not appear on the screen, tap the screen once to turn on the control buttons.
2. If the system information button (*i*) is still not visible, it is disabled in the system's Touch screen configuration. See [Configure the touch screen](#) to enable system information.
3. Touch the system information button (*i*) on the screen; the system information screen appears.



To close the system information screen:

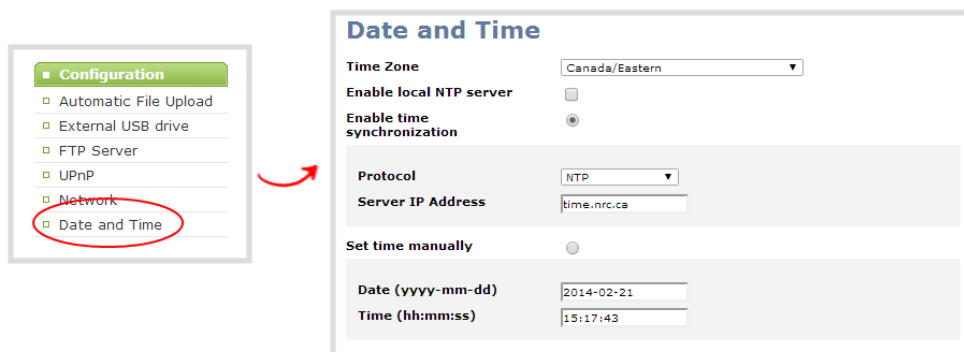
1. Touch anywhere on the screen to return to the previous screen.

Verify date and time settings

The current date, time, time zone, and synchronized time protocol settings are shown when the Date and Time configuration page is loaded in the Pearl web interface.

To view settings on the date and time configuration page:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Date and Time** link in the Configuration menu; the date and time configuration page opens and the following information is displayed:



The date and time configuration page also indicates whether the system is currently using synchronized or manually set time, and whether or not a local network time protocol (ntp) server is running.

The following table describes the date and time configuration fields.

Table 23 Date and Time 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

Label	Description/Options
	not selected.)

Configure synchronized time (NTP, PTP v1 and RDATE)

By default Pearl uses the network time protocol server (NTP server) protocol and a time server from National Research Council Canada. You can continue to use this time server or configure a new server that is more appropriate for your network and location. Your system administrator can provide the correct time synchronization server settings.


To set the time synchronization method:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Date and Time** link in the Configuration menu; the date and time configuration page opens.
3. Click the **Enable time synchronization** radio button if it is not already selected.
4. Choose one of the following choices from the **Protocols** drop down:

Table 24 Synchronized Time Options


Label	Description/Options
NTP	Network Time Protocol (NTP) is used for clock synchronization over the internet. There are many publicly available NTP servers you can use, or your company may have its own NTP server. 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 with older timekeeping systems.
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.

5. Tailor the synchronization protocol with the required parameters as described below.
6. If **NTP** is selected:
 - a. Enter the IP address or server name for the NTP server in the **Server IP Address** field.

 NTP uses UDP packets and port 123. If the system is behind a firewall and accessing an external NTP server, UDP packets must be permitted on port 123.

7. If **RDATE** is selected:
 - a. Enter the IP address or server name for the RDATE server in the **Server IP Address** field.
 - b. Select an update interval from the drop down box.
8. If **PTP v1** is selected:
 - a. Select the multicast address of PTP v1 server from the **PTP domain** drop-down.

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

 PTP uses UDP packets and ports 319 and 320 . If the system is behind a firewall and accessing an external PTP server, UDP packets must be permitted on ports 319 and 320.

9. Click **Apply**.

Configure the date and time manually

By default Pearl uses NTP for time synchronization. If your system does not have access to a time synchronization server, or if you do not wish to use one, you can choose to manually set the date and time.

To manually set the date and time:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Date and Time** link in the Configuration menu; the date and time configuration page opens.
3. Type the desired date in the **Date** field. Use the format yyyy-mm-dd.
4. Type the desired time in the **Time** field. Use the format hh:mm:ss.
5. Click **Apply**.

Change the time zone

By default the system has the Canada/Eastern time zone set. Configuration of the time zone is necessary to ensure synchronized time servers provide the correct time to the system.

To select another time zone:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Date and Time** link in the Configuration menu; the date and time configuration page opens.
3. Select the new time zone from the **Time Zone** drop down box.
4. Click **Apply**.

Configure a local NTP server

Pearl can run a local NTP server.

To configure a local NTP server:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Date and Time** link in the Configuration menu; the date and time configuration page opens.
3. Select the check box Enable local NTP server.

Video output ports

Pearl's rear panel includes two dual-mode DisplayPort video output ports (DisplayPort++) that can operate in either DisplayPort or HDMI/DVI video modes.



By default, DisplayPort 1 is set to show Auto A and DisplayPort 2 is set to show Auto B. Both are configured to maintain aspect ratio, use the display's default resolution, include audio at 100% but do not include the audio meter.

Using the web admin interface, you can choose to change the defaults and send any video source or channel through the video ports. For channels with audio, audio is also sent through the output ports (unless configured differently). To learn how to set and configure the video output port settings, see [Preview the video output port](#).



Using the video output ports takes CPU cycles and adds to the overall load on your Pearl. As a result, when using the video output ports you may not have enough CPU cycles left to encode and stream as many channels as you can when not using the video output ports. For best results, keep displays disconnected from the video output ports if you're not planning to use them.



To use the video output port with an HDMI or DVI display or projector, you'll need a DisplayPort to HDMI/DVI converter. See the important note about this below.

This section covers the following video output configuration topics:

- [Show a channel on the video output port](#)
- [Show a source on the video output port](#)
- [Select a resolution for the video output port](#)
- [View the video output port status](#)
- [Preview the video output port](#)
- [Disable the video output port](#)

- Disable or enable the audio on the video output port
- Configure the audio meter
- Rename a video output port

Important information about DisplayPort converters

There are two types of DisplayPort to HDMI/DVI converters. Whether or not you're using converters and the type of converter(s) you're using affects Pearl functionality.

Active and passive converter look very similar, so it's important to lookup the model number of the ones you are using to determine the type.

Passive DisplayPort converters

Passive DisplayPort to HDMI converters work only with DisplayPort++ video ports. They tell the video port to switch the video output signal to HDMI. Pearl video output ports are DisplayPort++, so they can be used with this type of converter.

For the purposes of this manual, these converters are referred to as **passive converters** attached to **HDMI displays** (although you may also be converting to DVI or any other video signal before connecting it to your monitor or display).

Active DisplayPort converters

Active converters are DisplayPort sink devices (also called DisplayPort receivers) that convert the DisplayPort signal to your desired output signal type.

For the purposes of this manual, these converters are referred to as **active converters** and have the same behavior as though the video output port is directly attached to a **DisplayPort display** (although you may also be conversion to HDMI, DVI, VGA, or any other video signal before connecting it to your monitor or display).

If using only one of the system's video output ports, you can use a direct DisplayPort cable, an active or a passive converter. However, if you're using both video output ports, you must use two of the same type of converter (both passive or both active) or use one active converter and one actual DisplayPort cable. When using passive converters, both video output ports must use the exact same output resolution.

The full restrictions and details are provided in the following table.

Table 25 Supported video output port configurations

Number of Displays	Cable 1	Cable 2	Output resolution
1	passive converter	n/a	Any (1024×768, 1280×720, 1280×960, 1360×768, 1400×1050, 1920×1080)

Number of Displays	Cable 1	Cable 2	Output resolution
1	active converter or DisplayPort cable	n/a	Any (1024×768, 1280×720, 1280×960, 1360×768, 1400×1050, 1920×1080)
2	passive converter	passive converter	Video output ports must both be set to the same resolution. Ideally pick a manual resolution setting. Do not use destination default resolution unless both monitors are the exact same make and model. Do not use same as source unless both video output ports are configured to show the same source or to show channels with identical encoding settings.
2	active converter or DisplayPort cable	active converter or DisplayPort cable	Displays can be set independently to any resolution up to 1080p (1024×768, 1280×720, 1280×960, 1360×768, 1400×1050, 1920×1080)
2	active converter or DisplayPort cable	passive converter	One of the two displays will fail to receive a signal.
2	passive converter	active converter or DisplayPort cable	Do not mix passive converters with active converters and DisplayPort cables.

If you only see output on one display (when you're trying to use both), check to make sure both your converters are active, both are passive or if you are using one DisplayPort cable and one converter, that the converter is active.

If both your converters are passive but you still only see output on one display, ensure the displays are configured to the same resolution (do not use destination default) and that both displays support that configured resolution ([Show a channel on the video output port](#) and [Show a source on the video output port](#) for configuration information). If the two monitors are not 100% compatible (cannot accept the same resolution refresh rate), try using two identical monitors (same brand and model).

If both using two active converters or one and a DisplayPort cable, ensure you are requesting resolutions supported by your displays and that both video output ports are displaying at 1920×1080 or less.

Show a channel on the video output port

You can choose to send any video source or channel through the video ports. You can adjust the output's video resolution and aspect ratio.

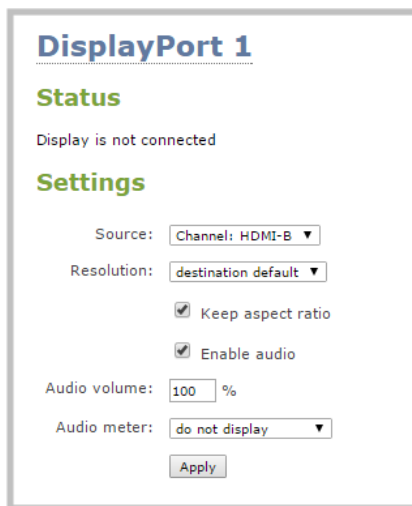
For channels with audio, you can configure whether or not audio is present and at what volume and can choose to include the audio meter to make the video output a replica of the confidence monitoring available on Pearl's front screen.



To use the video output port with an HDMI or DVI display or projector, you'll need a DisplayPort to HDMI/DVI converter. Ensure you read this **Important information about DisplayPort converters**.

To configure a channel to be displayed on the video output port:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click the name of your Output Port (by default called **DisplayPort 1** or **DisplayPort 2**); the video output port configuration page opens.




Settings page with a channel as the source.

3. From the **Source** drop down, select the channel (prefixed by the word **Channel**) you'd like to view on the video output port.
4. From the **Resolution** drop down, select the desired resolution to display on the video output port.

Value	Description
Same as source	Set the output to the same resolution as the channel. If that resolution is not supported by the display, the video output

Value	Description
	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.
1024×768, 1280×720, 1280×960, 1360×768, 1400×1050, 1920×1080	Choose a specific resolution for the output port. For an explanation of the different choices, see Show a channel on the video output port . Note: The same specific output resolution must be set for both video ports if using passive DisplayPort to HDMI or DVI adapters. See Important information about DisplayPort converters .

5. Check the **Keep aspect ratio check** box to have the system maintain the correct aspect ratio by adding black bars at the top and bottom or left and right sides of the video if the aspect ratio is different between the source and the chosen display aspect ratio. Uncheck to have the system stretch the source to fit the aspect ratio of the display.
6. Check the **Enable audio** check box to include audio in the output. (If you uncheck this box, silence is generated and output with the video.)
7. If needed, tweak the audio volume by entering a percent between 0 and 100 percent in the **Audio volume** field.
8. To add the audio meter to the output, select a position from the **Audio meter** drop down. To hide the audio meter, select **do not display**. The audio meter is set to a fixed size of 15% of the width (or height if displayed horizontally) of the display.



Note 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).

9. 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.
10. Click **Apply**.

Your channel is now configured for display via the video output port. Note that the video output port frame rate is set automatically to the channel's configured frame rate.

Show a source on the video output port

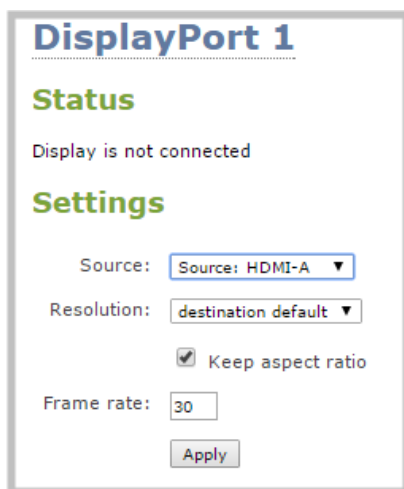
You can choose to send any video source through the video ports. You can adjust the output's video resolution, aspect ratio and frame rate.



To use the video output port with an HDMI or DVI display or projector, you'll need a DisplayPort to HDMI/DVI converter. Ensure you read this **Important information about DisplayPort converters**.

To configure a channel to be displayed on the video output port:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click the name of your Output Port (by default called **DisplayPort 1** or **DisplayPort 2**); the video output port configuration page opens.



Settings page with a video source (HDMI-A) as the source.

3. From the **Source** drop down, select the source (prefixed by the word **Source**) you'd like to view on the video output port.
4. From the **Resolution** drop down, select the desired resolution to display on the video output port.


Value	Description
Same as source	Set the output to the same resolution as the 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

Value	Description
	resolution, and when you choose this setting, the video output port will use the display's default resolution.
1024×768, 1280×720, 1280×960, 1360×768, 1400×1050, 1920×1080	Choose a specific resolution for the output port. For an explanation of the different choices, see Show a source on the video output port . Note: The same specific output resolution must be set for both video ports if using passive DisplayPort to HDMI or DVI adapters. See Important information about DisplayPort converters .

5. Check the **Keep aspect ratio check** box to have the system maintain the correct aspect ratio by adding black bars at the top and bottom or left and right sides of the video if the aspect ratio is different between the source and the chosen display aspect ratio. Uncheck to have the system stretch the source to fit the aspect ratio of the display.
6. Configure the **Frame rate** field to specify the number of frames per second sent out over the video output port.
7. Click **Apply**.

Select a resolution for the video output port

The display port's **resolution** (also known as frame size or display mode) is a count of the number of pixels displayed horizontally and vertically. For example the resolution 1920×1080 (which is 1080p) creates an image that is 1920 pixels wide and 1080 pixels tall.



Pearl always assumes that the output display uses square pixels.

The **aspect ratio** of an image (4:3 or 16:9) describes the proportional relationship between its pixel width and height. The resolution 1920×1080 (1080p) is quite a bit wider than it is tall. The ratio of its width to height is 16 to 9, represented as an aspect ratio 16:9.

You can choose from the following output resolutions in 4:3 and 16:9 aspect ratios for your video output ports.

4:3 resolutions

1024×768	1280×960	1400×1050
-----------------	-----------------	------------------

16:9 resolutions

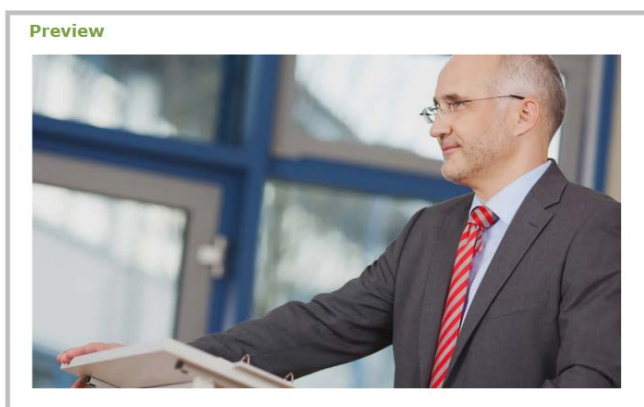
1280×720	1360×768	1920×1080
-----------------	-----------------	------------------

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.



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.

View the video output port status

At the top of the video output port configuration page is a status section that displays the actual settings used with the attached video display device.

To view the video output status:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).

2. Click the name of your Output Port (by default called **DisplayPort 1** or **DisplayPort 2**); the video output port configuration page opens.
3. See the **Status** section at the top of the page; possible status messages are described in the table below.

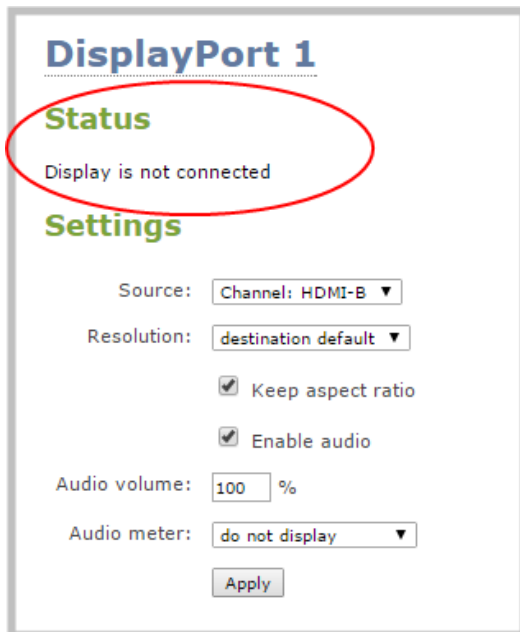


Table 26 Possible video output status messages

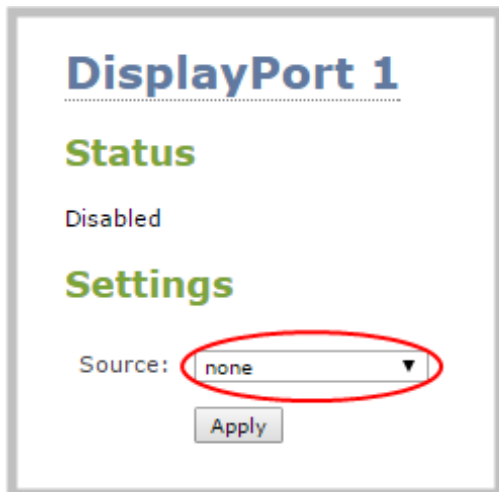
Message	Description
Disabled	This video output port is disabled in the configuration. See View the video output port status .
Display is not connected	There is no display connected to the video output port or the connected display is not powered on or not functioning.
Source is currently unavailable	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.
Output error	There is an error with output. Generally this happens because both video output ports are using passive display converters and are at different resolutions or because passive and active converters are being mixed. See Important information about DisplayPort converters .

Disable the video output port

You can choose to disable a video output port, so even if a display is connected, nothing is shown.

To disable the video output port:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click the name of your Output Port (by default called **DisplayPort 1** or **DisplayPort 2**); the video output port configuration page opens.



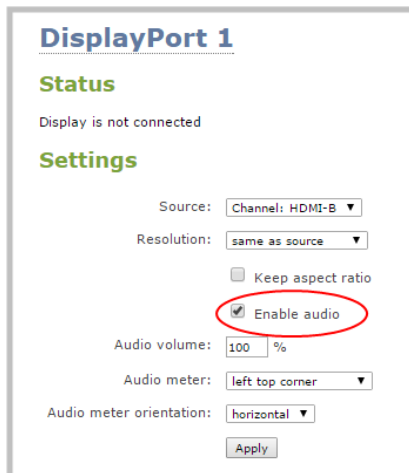
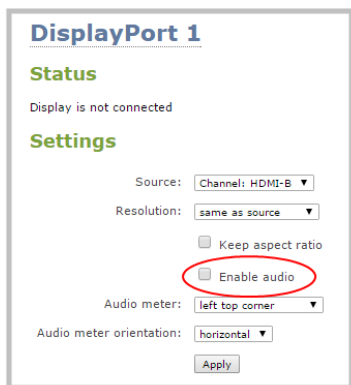
3. From the **Source** select **none** to disable the video output port.
4. Click **Apply**; the video output port is disabled and status is changed to Disabled.

Disable or enable the audio on the video output port

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. You can choose to disable audio, in which case Pearl will generate silence as the audio output. (Note: audio pass-through functionality is only supported with a channel as the source.)

To disable the audio on the video output port:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click the name of your Output Port (by default called **DisplayPort 1** or **DisplayPort 2**); the video output port configuration page opens.



Audio disabled for the video output port

Audio enabled for the video output port

3. To disable audio, uncheck the **Enable audio** check box. To enable audio, check it.
4. When audio is enabled, a second field appears for **Audio volume**. Configure with a value between 0 and 100 to moderate the volume of audio output over the video output port.
5. Click **Apply**.

Configure the audio meter

When outputting a channel you can also choose to output audio and (even if audio is silenced via this output port) choose to include the audio meter to make the video output a replica of the confidence monitoring available on Pearl's front screen. You can control the position and orientation of the audio meter.

To configure the audio meter for the video output port:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click the name of your Output Port (by default called **DisplayPort 1** or **DisplayPort 2**); the video output port configuration page opens.
3. Ensure a channel is selected as the source for the video output port. (Audio output and audio meter display are only supported for channels.)
4. From the **Audio meter** drop box select one of the following options.

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.

Value	Description
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.

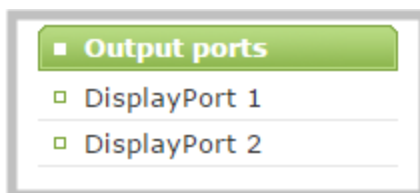
- If you've selected a location for the audio meter, you can also select orientation (horizontal or vertical) from the **Audio meter orientation** drop down.
- Click **Apply**.

Rename a video output port


By default Pearl's video output ports are named DisplayPort 1 and DisplayPort 2. Like channel and source names, you can change a video output port's name to better indicate its use. For example you might want to name one Projector Output and the other Confidence Monitor.

To change a video output port name:

- Login to the admin interface as **admin**. See [Connect to the admin interface](#).
- From the web interface, scroll to the Output ports menu option.



- Click the desired video output port link; the video output port configuration page opens.
- Click the **video output port name** at the top of the page; the name turns red.
- Highlight and delete the existing **source name**.
- Type a new name.
- Press **Enter** (on your keyboard) to save the new name.

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

PART 2: Capture

Capturing is the process of taking the signals from your video and audio sources and encoding them in a format that is ready for streaming and recording.

If you followed the quick start guide, you're already capturing, streaming and possibly recording your sources. The section of the guide helps you fine tune and troubleshoot the capturing process.

When using Pearl, you can stick to all the default capture and encoding settings, or you tweak them to set the up exactly as you like.

You can capture a single source at once, capture multiple sources in a custom channel or even switch between sources or groups of sources (layouts) while streaming and recording.

Techniques for creating channels to capture, stream and record a single source; to create custom channels with multiple sources and multiple layouts; and how to switch layouts while capturing are all described in this section.

The chapters in this section include:

- [Channels](#)
- [Live video mixing / switching](#)
- [Sources](#)
- [Troubleshooting](#)

What is a channel?

Pearl uses **Channels** to organize and display content captured from DVI, VGA, HDMI, SDI, and audio.

Channels make your sources (DVI, VGA, HDMI, SDI, and audio) available for streaming and recording. You choose how you want to configure your sources (and extras like images and text overlays) into layouts within your channel.

Pearl gives you a lot of control over how your sources are streamed. You are not limited to creating a **Channel** list that is a one-to-one reflection of your **Sources** list. You can make channels from some or all of your sources and you can add the same source to multiple single-source or multi-source layout channels.

For example, you could use the same source in all three of these situations, concurrently:

- as the only source in Channel 1 at 1080p, 30fps, 10,000 kbps;
- as the only source in Channel 2 at 720p, 15 fps, 2,000 kbps;
- in Channel 3 as part of a multi-source layout with picture in picture.

All channels can be streamed and recorded simultaneously. Following the example above, you could record any combination of those three channels, and stream one, two or all three of them using any available streaming methods.

In addition to creating multi-source channels, you can customize your channels by adding a images, company information, corporate colors and time stamps. Pearl has a visual layout editor to help you create exactly the layout you want to stream.

For each channel you create, you can use the layout editor to create one or more channel layouts. Then, while recording and/or streaming, you can switch live between different layouts. To learn about creating layouts, read [Create a custom channel](#) and [Custom channel layout editor](#). To learn how to do live video mixing / live video switching, see [Live video mixing / switching](#).

You can now create and upload customized "No Signal" images for use in your channels. These images are assigned to a specific source and display in any channel where the source is used but has no input detected. For more information on how to create a "No Signal" image, see [Add a No Signal image to a source](#)

Through channel configuration and fine-tuning you can maximize your stream quality, minimize your processing requirements and bandwidth. You can also specify how the video is presented and streamed to sharing destinations and viewers. Topics in this section include:

- [Use the automatic channels Auto A and Auto B](#)
- [Create a simple channel](#)
- [Configure encoding](#)

- Create a custom channel
 - Custom channel examples
 - Custom channel layout editor
 - Add a video source (custom channel)
 - Add an audio source (custom channel)
 - Add an image (custom channel)
 - Add a text overlay (custom channel)
- Live video mixing / switching
- Preview a channel
- Delete a channel
- Rename a channel

Use the automatic channels Auto A and Auto B

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

To use these channels, simply plug a source into one of the Row A inputs and, if desired, a second source into one of the Row B inputs. The system 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.



Audio for the auto channels is always as follows:

Video Source	Audio Source
SDI	SDI Audio
HDMI (DVI)	HDMI Audio (no audio for DVI)
VGA	TRS Audio


You can start viewing the channel immediately on the touch screen display (if enabled) or by using an internet browser on the same LAN or network. 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>

Or, if Bonjour services (which permit browsing by serial number) are not installed on the computer you can obtain the IP address from the touch screen display, if enabled, and browse to:

For Auto A: `http://<IP Address for Pearl>/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 interface 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.

Know which signal is used for Auto-A or Auto-B

Pearl has video input sensing, meaning it knows when there is a video signal coming through from an attached source.

If you attach more than one source to a row prior to powering on Pearl, the following priority is used:

Priority	Connector Type
1	HDMI (with HDMI Audio)
2	SDI (with SDI Audio)
3	VGA (with TRS Audio)

The auto channel uses a source until the source has no signal, then switches to the highest priority signal found.

For example, if you attach SDI, then VGA and TRS cables to Row A of your Pearl, Auto A will show SDI and use SDI audio until such time as the SDI video signal is lost. At that time Auto A switches to VGA video with TRS audio.

If you then connect HDMI to Row A (so you now have something connected to each video/audio port on Row A) and the VGA signal is lost, Auto A displays HDMI and uses HDMI audio as it is the highest priority signal.

If all the connected sources lose signal at the same time (i.e. for the example above when SDI loses video signal, no video signal is found on the VGA 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. See [Add a No Signal image to a source](#) for more information on setting no signal images.

Configure auto channels

Auto channels are included with Pearl 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 interface as **admin**. See [Connect to the admin interface](#).
3. Scroll to the Channels section.
4. Click Auto A or Auto B from the Channels section; the channel's status page opens.



5. Configure the channel as you would any other channel. See below.

You can change the source used for the two auto channels by selecting a different source from the layout editor in the Sources page. When you do this, the channel name changes to reflect the new source (if that is the only source is used for the channel). No auto switching is performed.

This is desirable if you know, for example, that you will always use SDI video with TRS audio and you never need the automatic switching capabilities of the auto channels.

Create a simple channel

Channels arrange the output from sources into a viewable and recordable stream. Although there are many ways you can customize a channel, this procedure walks you through the most **basic channel setup with a single source**. For multiple-source channels and advanced layout editing see [Add channel metadata](#). (You can always update this channel later to use multiple sources or multiple layouts.)

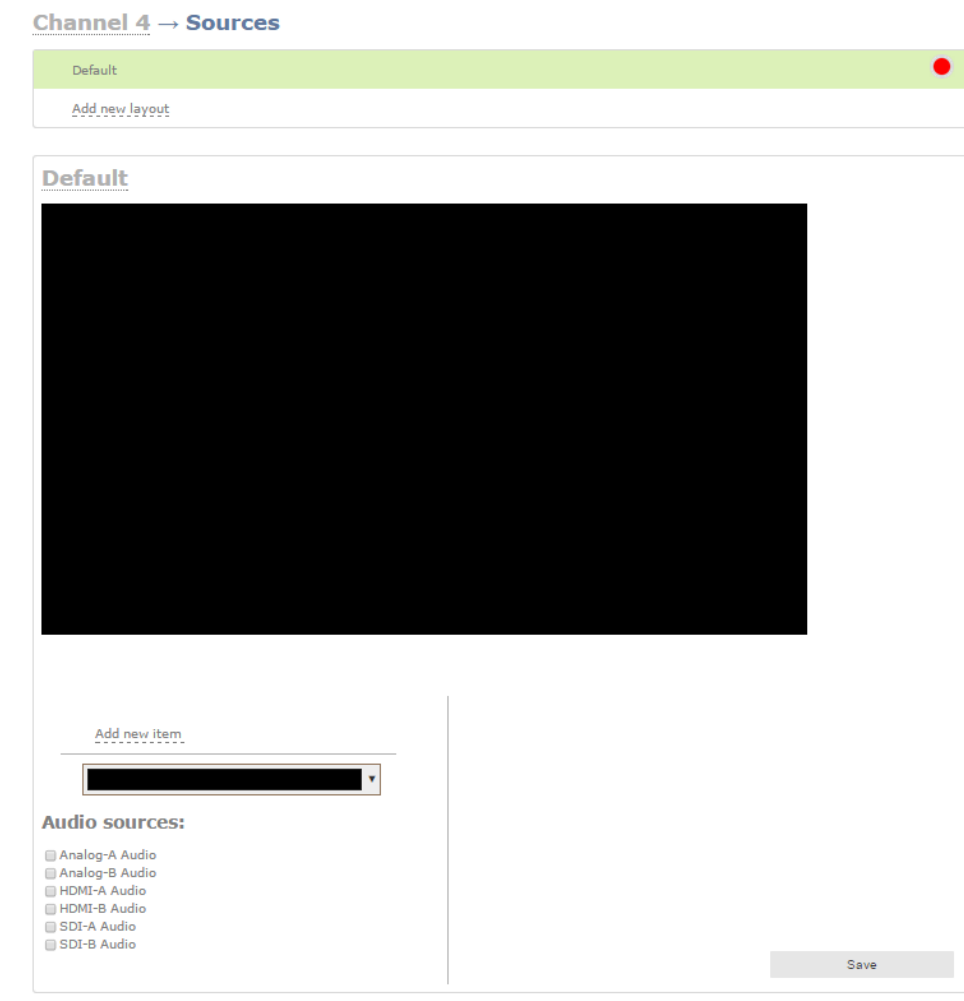
After creating this channel you'll be ready to stream it using the system default settings. Instructions to configure encoding, branding and CDN streaming are described in separate procedures.

To create a simple channel:

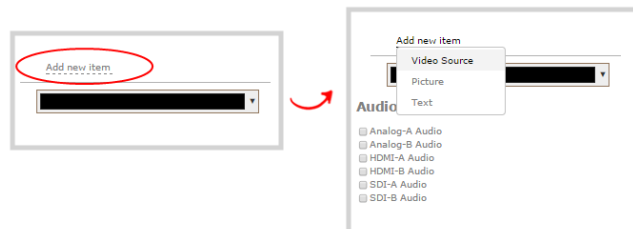
1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. Ensure a DVI, HDMI, VGA or SDI input source is connected to the device and you know the name of the source it is connected to. If you're not sure, see [What is a source?](#).
4. From the web interface, scroll to the **Channels** menu option. A list of existing channels, if any is displayed.
5. Click **Add channel** located at the bottom of the list; the Sources page opens.



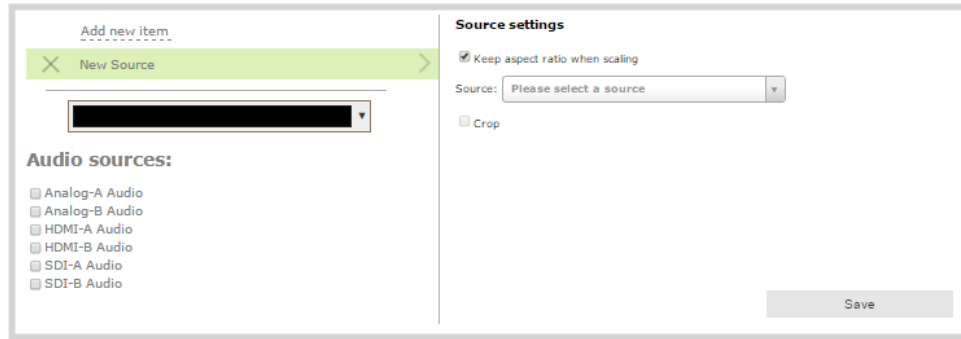
6. You're automatically editing the Default layout in the channel layout editor. (By default a 16:9 visual layout editor with a black background is shown.)



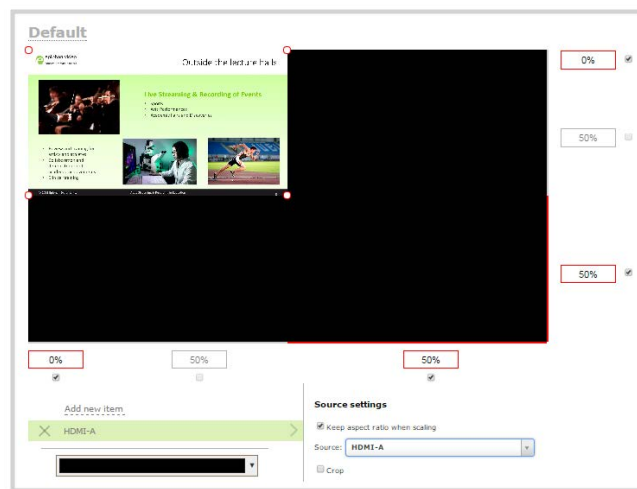
7. Click **Add new item** to add a layer to the layout; a drop down appears allowing you to choose the kind of item to add to your layout.



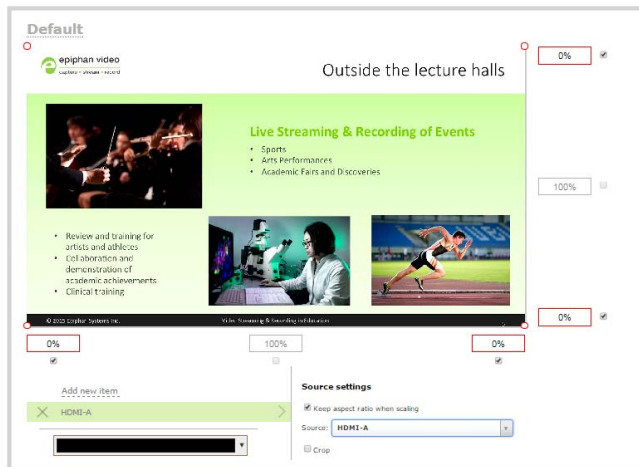
8. Select **Video Source** from the drop down; the new item is added to the layout and the **Source settings** box appears on the right side of the page.



9. Click the **Source** drop down and select your source; your source appears in the visual layout editor above.



10. For best results, keep the **Keep aspect ratio when scaling** checkbox checked in the **Source settings** box.
11. Use the red and white source handles in the visual editor to stretch your image to the full size of the layout.



12. If audio is desired, scroll down and choose an audio source from the displayed list.

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

13. Click **Save** at the lower right corner of the page; the layout changes are saved.

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 and view this, if desired. If you wish to change a channel's name directly, see **Rename a channel**.

Your channel is ready for basic streaming and recording.

By default (on a new channel), when the 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 layout editor screen. This happens because the encoding page has the **Use current signal resolution as frame size** setting selected by default. If you want to change the aspect ratio for your channel, see **Configure encoding**.

There are a lot of creative things you can do next with your channel, including creating more layouts and editing this layout to add images and more sources. See [Create a custom channel](#)

Create a custom channel

Pearl has two styles of channels.

1. Simple channels with a single source that fits the full screen, as discussed in [Create a simple channel](#)
2. Custom channels with one or more layouts, sources, background matte color and images.

Both types of channels are created using the same interface. In fact, custom channels are the same thing as simple channels, but they're called out separately in this manual because they are more complex. We call a channel a custom channel (or custom layout channel) when it has multiple sources, image elements, multiple layouts or any combination of those items.

So the only distinction between simple channels and custom channels is whether you choose to add any extra elements to the channel.

When making simple channels, your source takes up the whole screen, but with custom channels, you can organize sources, pictures and text overlays in different locations on your screen. We call these layouts, and each custom channel you create can have multiple layouts.

If you want to change the way things appear in your stream while streaming (aka video switching or video mixing), you'll need to create one layout for each of the views you want for your stream. Later, while you are streaming, you can switch live between the layouts using the web UI or Pearl's touch screen.




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 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 source that has a different frame size than those in other layouts.

As you saw when creating a simple channel, the first thing you need to do is create your (first) layout. Before getting started with custom channel layouts we recommend you review the [Custom channel layout editor](#) and get some inspiration from our [Custom channel examples](#). Then use the remaining topics in this section to help you create and configure your perfect custom channel layout(s)!

- [Create a custom channel or layout](#)
- [To upload an image](#)
- [Delete an uploaded image](#)
- [Add an image \(custom channel\)](#)
- [Add a video source \(custom channel\)](#)
- [Add an audio source \(custom channel\)](#)
- [Set the background color \(custom channel\)](#)
- [Add a text overlay \(custom channel\)](#)

- [Delete or move a layout \(custom channel\)](#)
- [Rename a layout \(custom channel\)](#)

Once you have your layouts created, read about [Live video mixing / switching](#) to learn how to change between layouts while streaming and/or recording.



Each layout you add to your channel adds a bit of overhead on Pearl- and more complex layouts take more resources. So it's a good idea to make sure you delete any layouts you're not using.

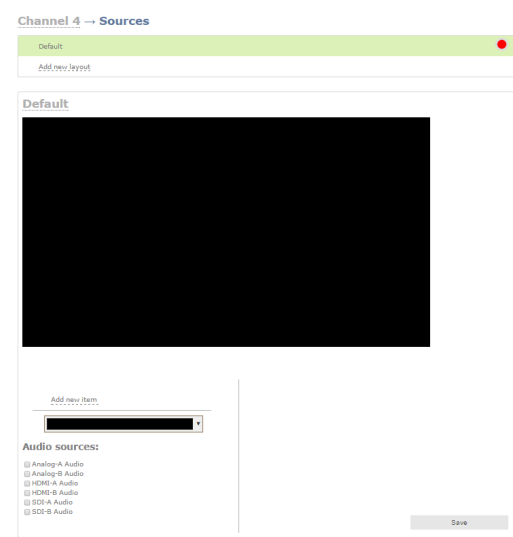
Custom channel layout editor

The visual channel layout editor gives you full control on size and position of the pictures, sources and text overlays you add to your channel.

You can edit existing channel layouts (even ones you initially created as simple channels) or you can create a new channel or a new layout within a channel to work with. To add a new layout, see [Create a custom channel or layout](#).

To select a layout for editing:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select your channel from the channels menu and click **Sources** for the channel.
3. Select the layout you want to edit by clicking anywhere in the layout row; the layout editor shows the current state of the selected layout for your channel and the row for the layout you're editing is highlighted green.

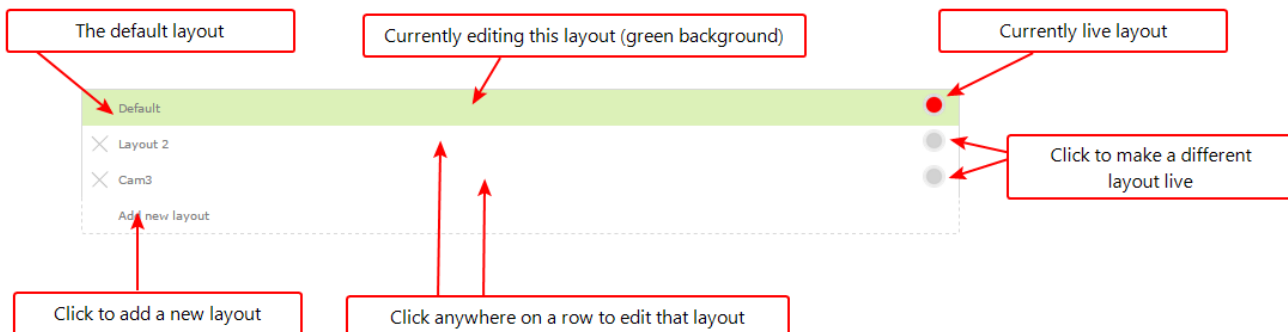


4. If this is a new layout, you are presented with an empty layout area and a black background matte.

The Sources page and channel layout editor is broken into a few pieces.

Layout selector

First there is the layout selector. From here you can pick which layout to preview/edit, create a new layout, delete a layout or select which layout is active.



Visual channel layout editor

Next is the channel layout editor where you can add pictures, sources and text overlays to your layout. You can also choose the background matte.



The heart of the channel layout editor is the layout area, which has the same frame size and aspect ratio as your stream. As you add items to the layout, they appear in the layout area. The currently selected item is presented in full colour while other items appear transparent.

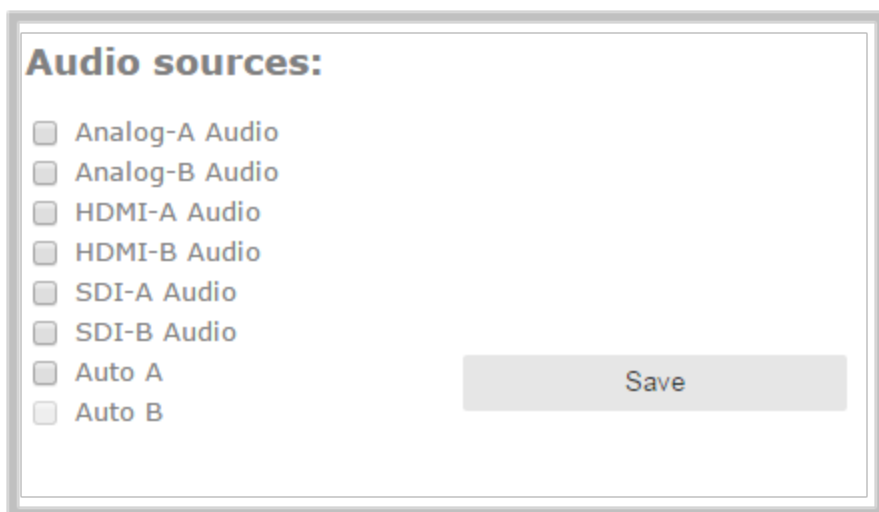
To **position** the items you can use the mouse to click and drag, or you can use the manual positioning values to set a location as a percent of the screen (by typing a value followed by the percent sign, e.g. 4%) or in pixels (by typing a value followed by px, e.g. 16px).

You can **resize** items by clicking and dragging the red and white circles at the corners of the items or by using the manual positioning values. For example entering 0% in all four of the outside boxes will stretch the item to the full size of the layout area.


You can modify the settings for each item by clicking the row. The item's settings box appears. See [Add an image \(custom channel\)](#), [Add a video source \(custom channel\)](#) and [Add a text overlay \(custom channel\)](#) for more details on item settings.

Audio source selector and save button

The last section of the Sources page is the audio selector and the (very important) **Save** button.



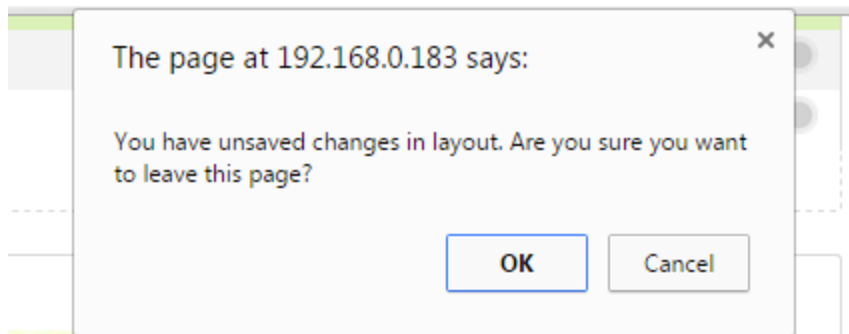
Select the audio source(s) you want to add to your channel.

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

Audio sources are mixed together at the same volume level as one another.

When you're done all your changes, use the Save button to save the changes to your layout.

If you accidentally try to leave the layout without saving, Pearl reminds you to save before leaving.






Ready to make some layouts of your own? Try these topics:

- Create a custom channel or layout
- Add a video source (custom channel)
- Add an audio source (custom channel)
- Add an image (custom channel)
- Add a text overlay (custom channel)
- Delete or move a layout (custom channel)
- Set the background color (custom channel)
- Rename a layout (custom channel)

Custom channel examples




Here are a few examples of what you can do with just two sources and two picture files. Use your imagination to create the layouts you want!

Layout example	Description
A screenshot of a presentation slide. The slide has a light green background. At the top left is the "epiphany video" logo. The title is "Virtual Labs and Tutorials". Below the title are two sections: "Virtual Labs/Tutorials" with three bullet points, and "Simple Integration with Web Conferencing Systems" with two bullet points. There are two images on the right side of the slide: one showing hands working with lab equipment and another showing a person at a computer. At the bottom, there is a footer with "© 2015 Epiphany Systems Inc." and "Video Streaming & Recording in Education".	<p>One source (a slideshow presentation in this case), at the full size of the channel. (Simple channel)</p> <p>To get this look: Add one source to the layout, select keep aspect ratio and stretch to fit the full layout size.</p>

Layout example	Description
	<p>One source (a slideshow presentation in this case), with a green background matte.</p> <p>To get this look: Select a background color. Add a source to the layout and size appropriately, leaving the background matte visible.</p>
	<p>One source with a logo (.png with transparency) in the bottom left corner.</p> <p>To get this look: Upload an image with transparency through the Branding Content page. Follow the steps from the first example to add the source, then add a picture item and place it where desired.</p>
	<p>One source with a text overlay in the bottom right corner.</p> <p>To get this look: Follow the steps from the first example to add the source, then add a text overlay item to the layout. Enter your text in the settings box and place it where desired.</p>

Layout example	Description
	<p>One source with a background image.</p> <p>To get this look: Upload your background image (must have the right aspect ratio) through the Branding Content page. When creating the layout, first add the picture and stretch it to the full screen. Next, follow the steps from the first example to add the source.</p>
	<p>Two sources with a background image.</p> <p>To get this look: Follow the steps for the example above, then add and position a second source.</p>
	<p>Two sources (one cropped to a new aspect ratio), a background image and a logo.</p> <p>To get this look: Upload your background and logo images through the Branding Content page. When creating the layout, first pick the background, then the sources, and lastly the logo. Size and position each. For the second source, click "cropping" in the source settings and select the desired crop.</p>

A few more examples, this time including a 4x3 source.

Layout example	Description
	<p>One source, at the full size of the channel. (Simple channel)</p> <p>To get this look: Add one source to the layout, select keep aspect ratio and stretch to fit the full layout size. (Note the channel broadcasts in 4x3 if you have Use current signal resolution as frame size selected on the encoding page.)</p>
	<p>One 4x3 source in a 16x9 frame, with a green background matte.</p> <p>To get this look: Make sure your encoding page has a 16x9 frame size. From the sources page, select a background color. Add a source to the layout and stretch to the full height of the screen, leaving the background matte visible.</p>
	<p>A 4x3 source and a cropped 16x9 source together with a background image.</p> <p>To get this look: Upload an image through the Branding Content page. Follow the steps from the first 4x3 example (two rows up) to add the sources then use the crop utility to crop the second source to a square aspect ratio.</p>

Time to get started on your own layouts! See:


- [Create a custom channel or layout](#)
- [Custom channel layout editor](#)

Create a custom channel or layout

We call a channel a custom channel (or custom layout channel) when is has multiple sources, image elements, multiple layouts, or any combination of those items. Custom layouts give you full control on size and position

of the pictures, sources and text overlays you add to your channel.

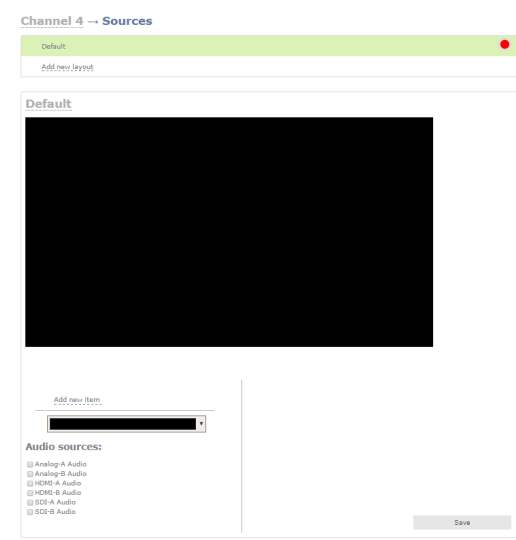
Use this procedure to help you create a new channel or layout, then use the related procedures to add elements to your layout.



If you're planning to use live switching, we strongly recommend you rename the channel rather than using the default channel name (**Rename a channel**). See the note at the bottom of this topic to avoid streaming and recording issues resulting from adding or deleting layouts when live switching.

To create a new custom channel (with default layout) or add a layout to an existing channel:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Do one of the following to make the Sources page appear:
 - a. select your channel from the channels menu and click **Sources** for the channel; or
 - b. select the **Add channel** link to create a new channel.
3. Next, pick one of the following actions to create or select a layout to edit:
 - a. select the layout you want to edit by clicking anywhere in the layout row; or
 - b. click **Add Layout** to create a new layout.
4. The layout editor shows the current state of the selected layout for your channel and the row for the layout you're editing is highlighted green.



5. If this is a new channel or layout, you are presented with an empty layout area with a black background matte.

Now that you've created your layout, you can start adding items to it. See these topics:

- [Add a video source \(custom channel\)](#)
- [Add an audio source \(custom channel\)](#)
- [Add an image \(custom channel\)](#)
- [Add a text overlay \(custom channel\)](#)
- [Delete or move a layout \(custom channel\)](#)
- [Set the background color \(custom channel\)](#)
- [Rename a layout \(custom channel\)](#)

Important note for channels with multiple layouts

By default (and historically), Pearl's channels are named automatically based on the content in the channel.

When a channel has only one layout, and that layout has only one source (regardless of whether or not there are pictures or overlays in the layout), the channel name is the same as the source name

For example: By default, a channel with one layout that has HDMI-A in it will be named HDMI-A.

When you add a second layout to a channel, the channel name changes to a generic name **Channel X** (where X is the channel index number). Normally this wouldn't pose any problem, but the changing name does have some side effects: the stream is stopped and restarted, and the channel's recorder (if recording) is stopped and a new file is started.

Furthermore, when you delete layouts in a channel until there is only one layout (with one source) left, the channel name reverts to the source name.

To avoid any issue with changing channel names on channels where you'll have more than one layout, we strongly recommend you rename the channel to a custom name (**Rename a channel**). This will ensure no automatic channel name changes.

Add a video source (custom channel)

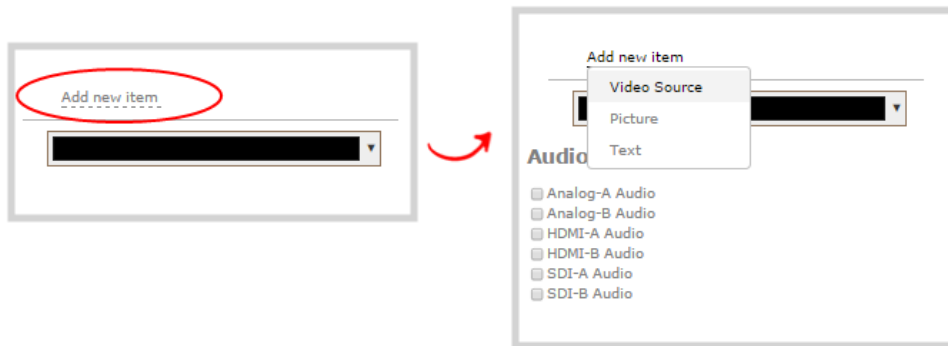
A source needs to be added to a channel before the channel is ready to stream. In the case of custom channels with layouts, you can add one or more sources to the layout area.

You can add a source to a layout on an existing channel or you can create a new channel. If you're not sure how to create a channel or a layout, start by reviewing the first few steps in the topic [Custom channel layout editor](#) or start with [Create a simple channel](#).

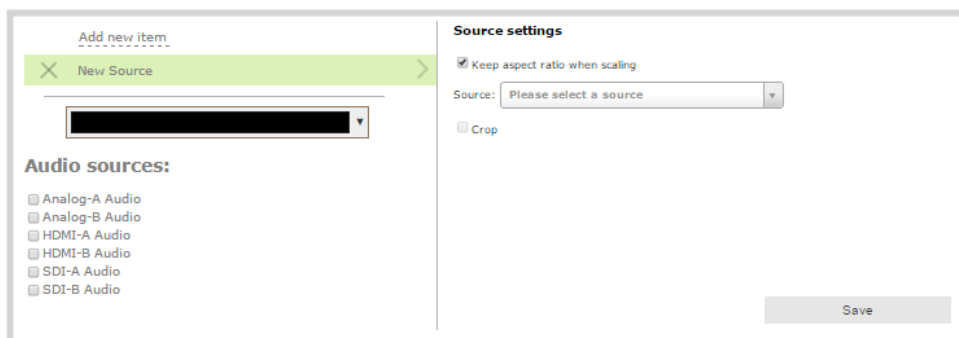
To add a source to your layout:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).

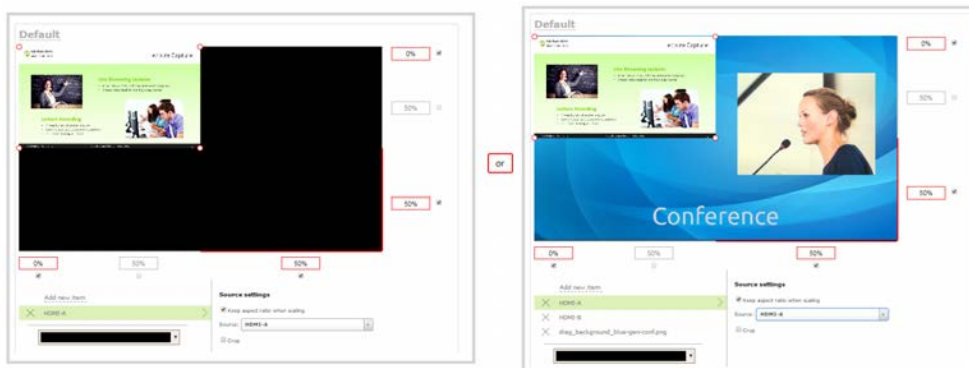
2. Follow the steps in [Custom channel layout editor](#) or [Create a custom channel or layout](#) to get to the channel layout editor.
3. From the channel layout editor, click **Add item**; a drop down box appears. (If you have any other items already in your layout, the new item appears at the top of the list.)



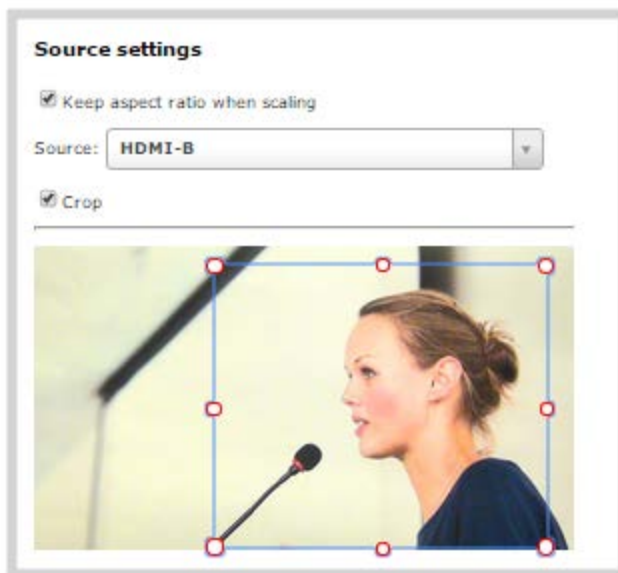
4. Select Video Source from the drop down; the new item is added to the layout and the **Source settings** box appears on the right side of the page.



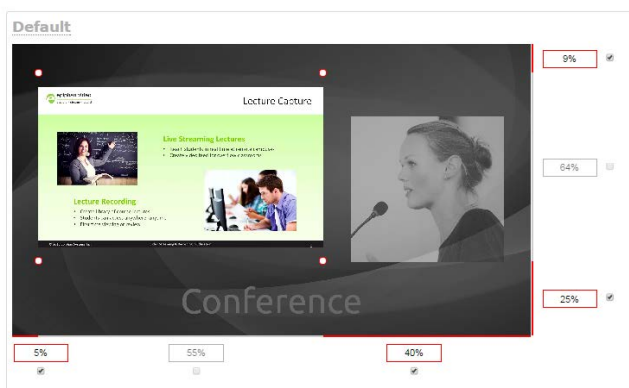
5. Click the **Source** drop down and select your source; your source appears in the visual layout editor above.



- 6. For best results, select the **Keep aspect ratio when scaling** checkbox from the **Source settings** box.
- 7. If desired, select **Crop** from the **Source settings** box and use the red and white handles to draw a box around the section of the source you'd like to have in the layout; your cropped selection changes in the layout area.



- 8. Moving back to the layout area, use the mouse, the keyboard or the manual position value fields to position and resize your source. You can click and drag, stretch using the handles in the layout area, or type values into the fields. See the note below for more information.



- 9. If needed, re-order the items in your layout by clicking and dragging items in the item list (under the **Add new item** link).

For example, if you added your video source over a text overlay, the video source could conceal the overlay. To fix it, drag the video source item below the text item in the list, or vice-versa.

10. When your layout is complete, scroll to the bottom of the page and click **Save** to save your work.

Other things you may want to add to your layout:

- Add an audio source (custom channel)
- Add an image (custom channel)
- Add a text overlay (custom channel)
- Delete or move a layout (custom channel)
- Set the background color (custom channel)
- Rename a layout (custom channel)

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 red and white circles to resize the item as you wish. 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, hold the down 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. Make more refined movements by holding down the Ctrl key on your keyboard while pressing the up, down, left or right keys. You can also hold the Shift key while using the arrow keys to control the size of the item on the layout. Hold 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. The image will move and resize to honor the space you specified. For example to move the item in 12% from the left side of the layout area, enter 12% in the bottom left positioning value square. The image will resize to accommodate your change. If you further enter 15% in the bottom right positioning value square, the image will be centered and take up 76% of the width of the layout area.

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.

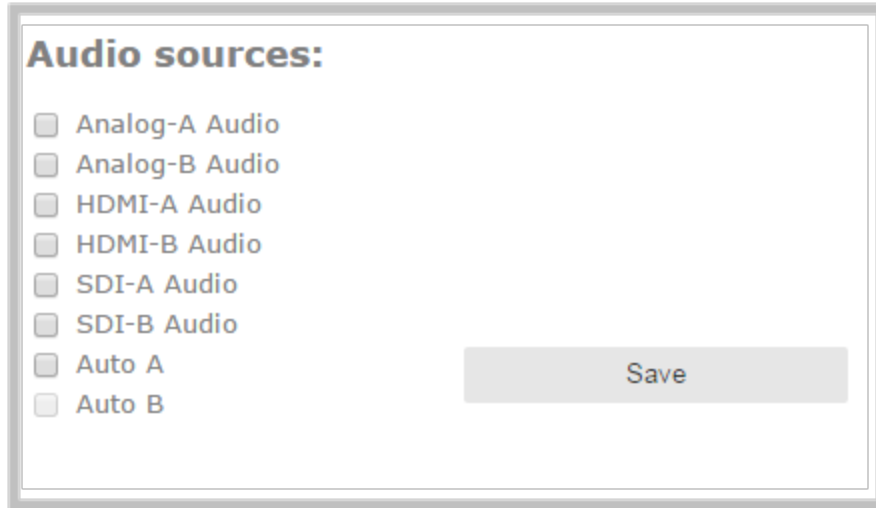
Add an audio source (custom channel)

To stream the audio for a source you need to add it to a channel and make sure audio is enabled in the channel's encoding page. (Audio is enabled in the encoding page by default.)

Audio must be added to each layout for your channel. You can use the same audio for each layout, or if you desire, you can have different layouts use different audio. If you're not sure how to create a channel or a layout, start by reviewing the first few steps in the topic [Custom channel layout editor](#) or start with [Create a simple channel](#).

To add an audio source to your layout:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Follow the steps in [Custom channel layout editor](#) or [Create a custom channel or layout](#) to get to the channel layout editor.
3. Select the audio source(s) you want to add to your channel. Audio sources are mixed together at the same volume level as one another.



Audio sources:

- Analog-A Audio
- Analog-B Audio
- HDMI-A Audio
- HDMI-B Audio
- SDI-A Audio
- SDI-B Audio
- Auto A
- Auto B

Save

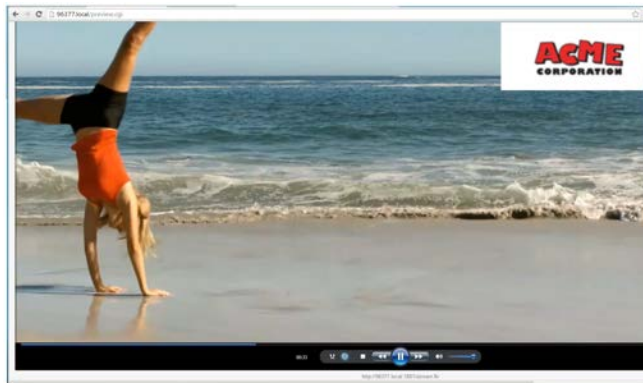
4. When your layout changes are complete, scroll to the bottom of the page and click **Save** to save your work.
5. Follow the steps in [Configure audio codec](#) to ensure audio is enabled for your channel and to select your audio settings.


Other things you may want to add to your layout:

- [Add a video source \(custom channel\)](#)
- [Add an image \(custom channel\)](#)
- [Add a text overlay \(custom channel\)](#)
- [Delete or move a layout \(custom channel\)](#)
- [Set the background color \(custom channel\)](#)
- [Rename a layout \(custom channel\)](#)

To upload an image

You can customize your channels by adding pictures as backgrounds, overlays or information. Collectively the images you upload to the system are known as branding images.

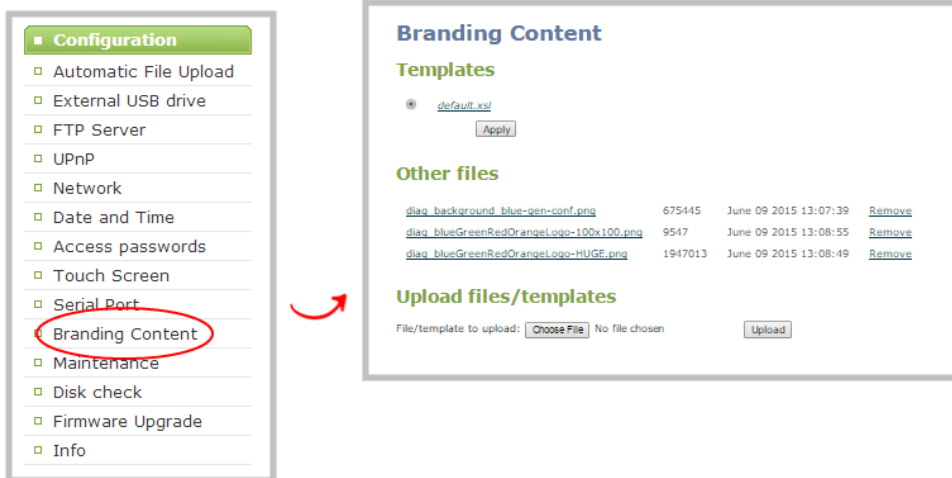


 For best results always upload images that are already the correct size needed in your layout. Background images should match the frame size of your channel (frame size is set in the **Encoding** configuration page).


There are two ways to upload branding images. You can upload images to the branding page, as described in this procedure, or you can drag and drop images using the procedure described in [Add an image \(custom channel\)](#). Note that using the procedure below is the only way to see whether or not you'll be overwriting an existing image.

To upload a branding image to the branding page:

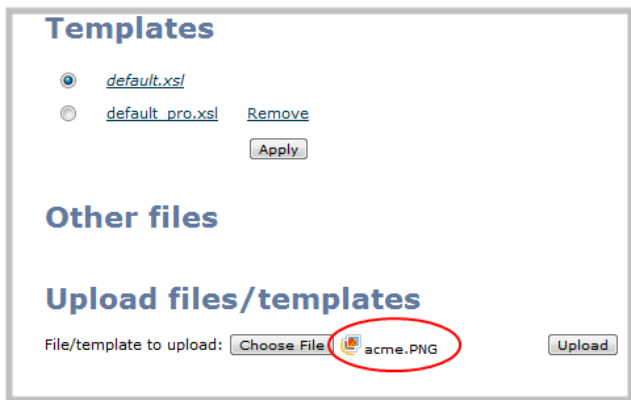
1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. Click **Branding Content** under the Configuration menu; the configuration page opens.



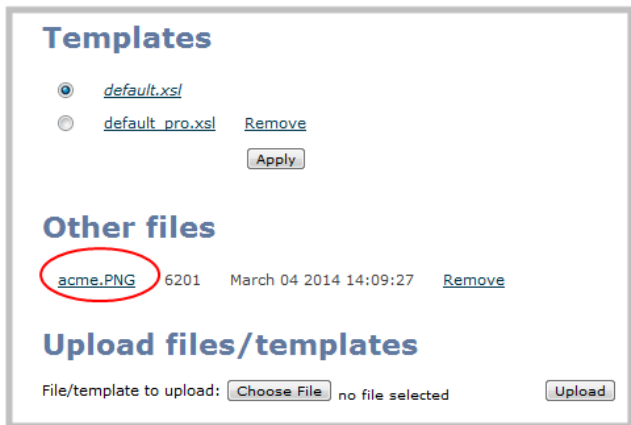
4. Click **Choose File**; a browser page opens.
5. Navigate to the folder on your admin computer that contains the logo.
6. Select the file, the following file formats are supported: PNG and JPEG.

 The maximum supported file size is 3840x2160. No warning or error message is displayed if your image is too large. Files that exceed the maximum size do not appear in the drop-down list when selecting an image.

7. Click **Open**; the file is added to the File/template to upload field.



8. Click **Upload**; the file is uploaded and displayed in the Other files section.



See the following topics to learn how to apply the logo, background, overlay text or other images to a channel:

- [Add an image \(custom channel\)](#)
- [Add a text overlay \(custom channel\)](#)

Add an image (custom channel)

You can use images in your custom channel layouts to create a background for your source, to add your corporate logo, or to add relevant information about the event you're streaming.

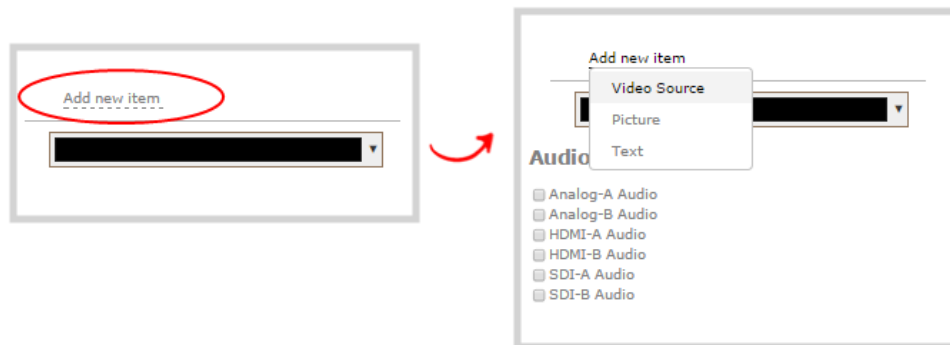
Pearl supports png (PNG) and .jpg (JPEG) images. You can upload any image from 16×16 pixels to a maximum size of 3840×2160, however it's strongly recommended that you upload exactly the size you need to avoid having your image scaled.

In earlier releases, there were separate procedures for adding backgrounds and logos to a channel. These actions are now both considered adding an image to a custom channel layout and can be accomplished with the steps below.

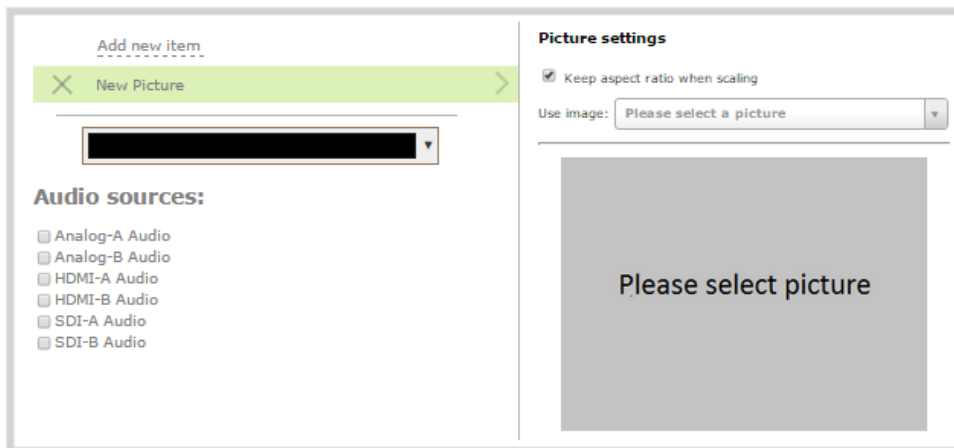
You can add a picture to a layout on an existing channel or you can create a new channel. If you're not sure how to create a channel or a layout, start by reviewing the first few steps in the topic [Custom channel layout editor](#) or start with [Create a simple channel](#).

To add a picture to your layout:


1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Follow the steps in [To upload an image](#) or [Create a custom channel or layout](#) to upload your image, if not already uploaded. If you like, you can also use the drag and drop technique described below.
3. Follow the steps in [Custom channel layout editor](#) to get to the channel layout editor.
4. From the channel layout editor, click **Add item**; a drop down box appears. (If you have any other items already in your layout, the new item appears at the top of the list.)

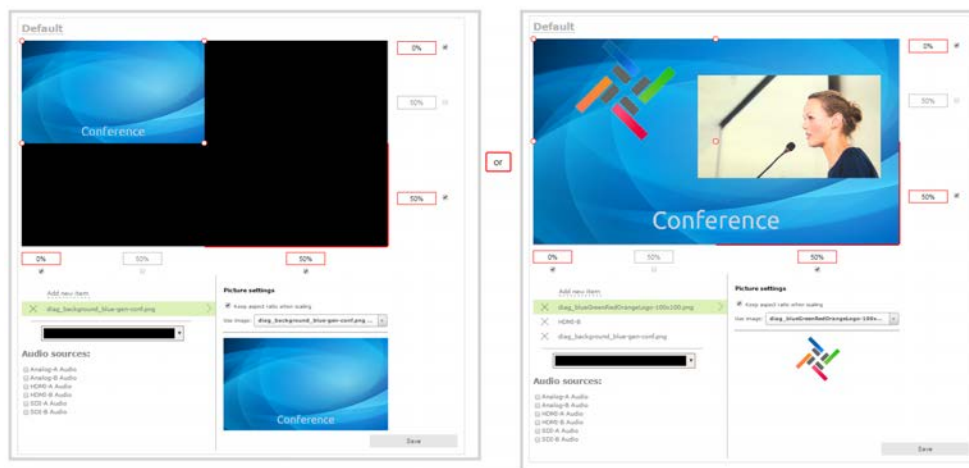


5. Select **Picture**; the **Picture Settings** section appears on the right side of the page.



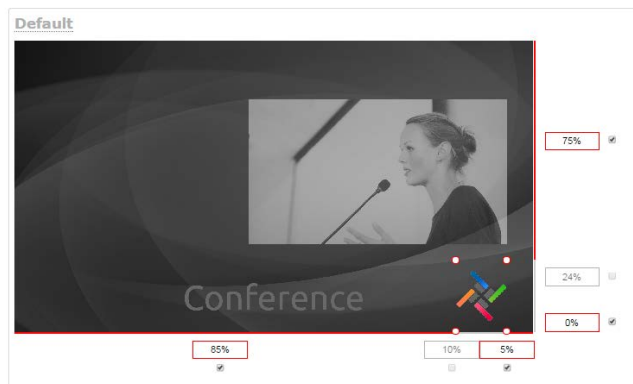
6. If you haven't already uploaded your image, you can drag and drop it from your desktop to the gray **Please select picture** box. (Note: no warning is displayed if the image is too large or will replace another file).
7. If you have already uploaded the image, click the **Use image** drop down to select an image you have uploaded to the system;
8. Your picture appears in the **Picture settings** preview and is added to the layout area. It is selected for sizing and positioning.

 If your uploaded image does not appear in the list, ensure it doesn't exceed the maximum file size of 3840×2160.



9. For best results, keep the **Keep aspect ratio when scaling** checkbox selected in the **Picture settings** box. (This is selected by default.)

- 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. See the note below for more information on positioning techniques.



- If needed, re-order the items in your layout by clicking and dragging items in the item list (under the **Add new item** link).

For example, if you added your background image after adding a video source, the background image conceals the video source. To fix it, drag the video source item above the background image item in the list, or vice-versa.

- When your layout is complete, scroll to the bottom of the page and click **Save** to save your work.

Other things you may want to add to your layout:

- Add a video source (custom channel)
- Add an audio source (custom channel)
- Add a text overlay (custom channel)
- Delete or move a layout (custom channel)
- Set the background color (custom channel)
- Rename a layout (custom channel)

A note about item positioning and sizing

There are four ways to position and size items in the layout area

- using the mouse
- 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 red and white circles to resize the item as you wish. 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, hold the down 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. Make more refined movements by holding down the Ctrl key on your keyboard while pressing the up, down, left or right keys. You can also hold the Shift key while using the arrow keys to control the size of the item on the layout. Hold 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. The image will move and resize to honor the space you specified. For example to move the item in 12% from the left side of the layout area, enter 12% in the bottom left positioning value square. The image will resize to accomodate your change. If you further enter 15% in the bottom right positioning value square, the image will be centered and take up 76% of the width of the layout area.

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.

Add a text overlay (custom channel)

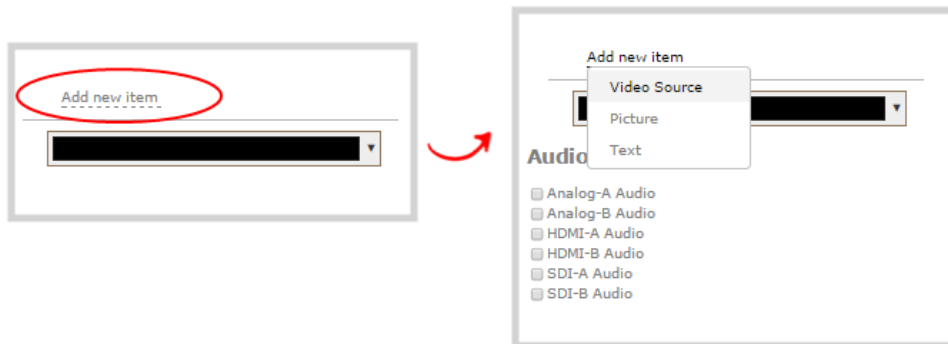
Adding the date and time, channel name or other custom text as an overlay on your video is an easy way to customize your stream.

You can add an overlay to a layout on an existing channel or you can create a new channel. If you're not sure how to create a channel or a layout, start by reviewing the first few steps in the topic [Custom channel layout editor](#) or start with [Create a simple channel](#).

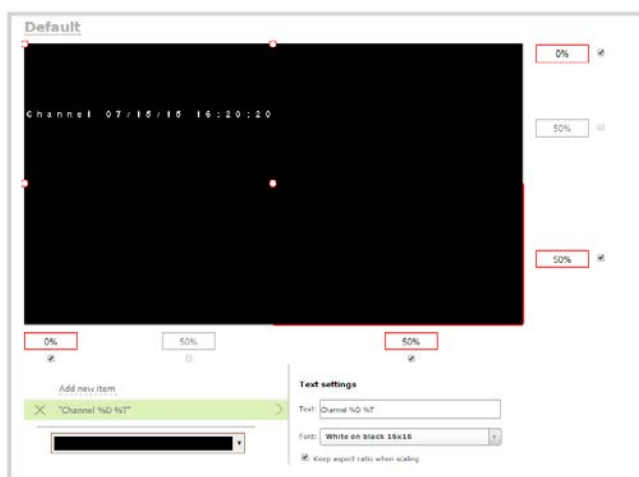
To add a picture to your layout:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).

2. Follow the steps in [Custom channel layout editor](#) or [Create a custom channel or layout](#) to get to the channel layout editor.
3. From the channel layout editor, click **Add item**; a drop down box appears. (If you have any other items already in your layout, the new item appears at the top of the list.)



4. Use the item type drop down box to select **Text**; the Text settings box appears and the layout area is updated with the text overlay.



5. In the **Text** field, specify the overlay text you want to add to the layout. Use your own text and any combination of the shortcut codes listed at the end of this procedure.

For example: Use this string:

`%A %B %d, %G. Live streaming channel Auto A.`

to obtain these results (**Thursday February 26, 2015. Live streaming channel Auto A.**):



6. Use the font drop down to select the size of your text.
7. For best results, select the **Keep aspect ratio when scaling** checkbox from the **Text settings** box. (This is selected by default.)
8. In the layout area, use the mouse or the manual position value fields to position and resize your text overlay. (You may first need to change the height of the text box handles before you can proceed with resizing or positioning.) See the note below for more information on positioning techniques.
9. If needed, re-order the items in your layout by clicking and dragging items in the item list (under the **Add new item** link).

For example, if you added your overlay text before adding a video source, the video source conceals the overlay text. To fix it, drag the overlay text item above the video source item in the list, or vice-versa.

10. When your layout is complete, scroll to the bottom of the page and click **Save** to save your work.

Table 27 Time Format options

Field	Value	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

Other things you may want to add to your layout:

- [Add a video source \(custom channel\)](#)
- [Add an audio source \(custom channel\)](#)
- [Add an image \(custom channel\)](#)
- [Delete or move a layout \(custom channel\)](#)
- [Set the background color \(custom channel\)](#)
- [Rename a layout \(custom channel\)](#)

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 red and white circles to resize the item as you wish. 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, hold the down 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. Make more refined movements by holding down the Ctrl key on your keyboard while pressing the up, down, left or right keys. You can also hold the Shift key while using the arrow keys to control the size of the item on the layout. Hold 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. The image will move and resize to honor the space you specified. For example to move the item in 12% from the left side of the layout area, enter 12% in the bottom left positioning value square. The image will resize to accommodate your change. If you further enter 15% in the bottom right positioning value square, the image will be centered and take up 76% of the width of the layout area.

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.

Set the background color (custom channel)

When you create a custom channel layout, you can select the background color to fill any unused space. For example you can add a color from your corporate color scheme.

To add a picture to your layout:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Follow the steps in [Custom channel layout editor](#) or [Create a custom channel or layout](#) to get to the channel layout editor.
3. From the channel layout editor, click the drop down arrow next to the existing (by default black) background color; 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. When your layout is complete, scroll to the bottom of the page and click **Save** to save your work.

Rename a layout (custom channel)

Layouts you create are automatically given a default name (the first one is Default!). You can keep these names, or you can edit them to something more descriptive.

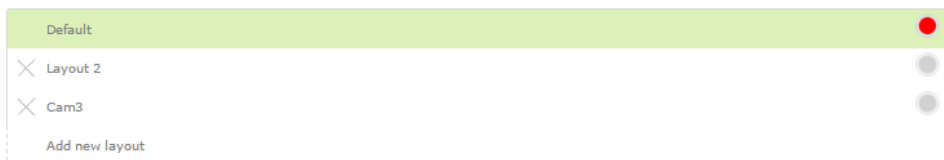


If you're using the touch screen for **Live video mixing / switching**

You can rename any layout, even the currently active layout.

To rename a layout:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Follow the steps in [Custom channel layout editor](#) or [Create a custom channel or layout](#) to get to the channel layout editor.
3. From the layout picker, click on the row of the desired layout; the layout appears in the editor below.



4. From the editor, click the name of the layout; it turns red.



5. Type in your new layout name and press **Enter** to save the new name. (Note if you click somewhere else without pressing Enter, your changes are discarded.)

Delete or move a layout (custom channel)

Your custom channel can have multiple layouts. The order they are listed in the web UI is also the order they are presented on the touch screen. It's simple to re-order layouts or erase layouts you're not using any more.

Reorder layouts


To move a layout:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Follow the steps in [Custom channel layout editor](#) or [Create a custom channel or layout](#) to get to the channel layout editor.
3. Using the rows in the layout selector, click and drag to rearrange the order of your layouts.



Delete layouts

You can delete any layout except the currently active layout.



If you're planning to use live switching, we strongly recommend you rename the channel rather than using the default channel name (**Rename a channel**). See the note at the bottom of this topic to avoid streaming and recording issues resulting from adding or deleting layouts when live switching.

To delete a layout:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Follow the steps in [Custom channel layout editor](#) to get to the channel layout editor.
3. Click the **X** at the left side of the row for the layout you wish to delete; the system prompts you to make sure you want to delete the layout.



4. Click **OK** to proceed; the layout is deleted.

Important note for channels with multiple layouts

By default (and historically), Pearl's channels are named automatically based on the content in the channel.

When a channel has only one layout, and that layout has only one source (regardless of whether or not there are pictures or overlays in the layout), the channel name is the same as the source name

For example: By default, a channel with one layout that has HDMI-A in it will be named HDMI-A.

When you add a second layout to a channel, the channel name changes to a generic name **Channel X** (where X is the channel index number). Normally this wouldn't pose any problem, but the changing name does have some side effects: the stream is stopped and restarted, and the channel's recorder (if recording) is stopped and a new file is started.

Furthermore, when you delete layouts in a channel until there is only one layout (with one source) left, the channel name reverts to the source name.

To avoid any issue with changing channel names on channels where you'll have more than one layout, we strongly recommend you rename the channel to a custom name (**Rename a channel**). This will ensure no automatic channel name changes.

Delete an uploaded image

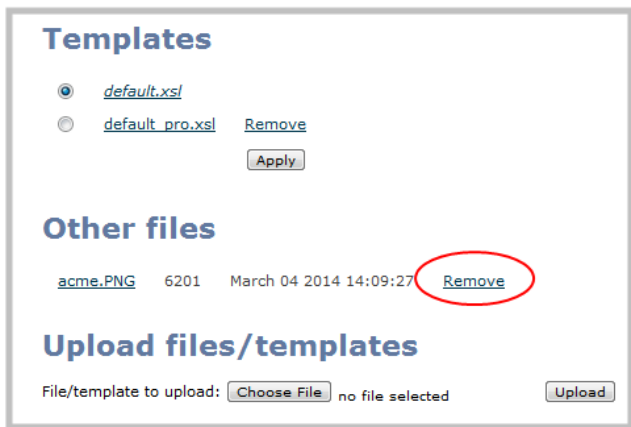
Images used in custom channel layouts are stored on the system hard drive. You can delete an image after you are done using it, or to when performing general housekeeping duties on the system.

To delete an uploaded image:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).

If the image 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.

3. Click **Branding Content** under the Configuration menu; the configuration page opens.



4. Click **Remove**; a confirmation dialog box opens.
5. Click **OK**; the dialog box closes and the image file is removed from the configuration page.

Configure encoding

You can modify the encoding settings for each channel you create. These settings let you perfect your stream by selecting the right frame size, bit rate, audio/video codecs and more.

This section covers the following encoding topics:

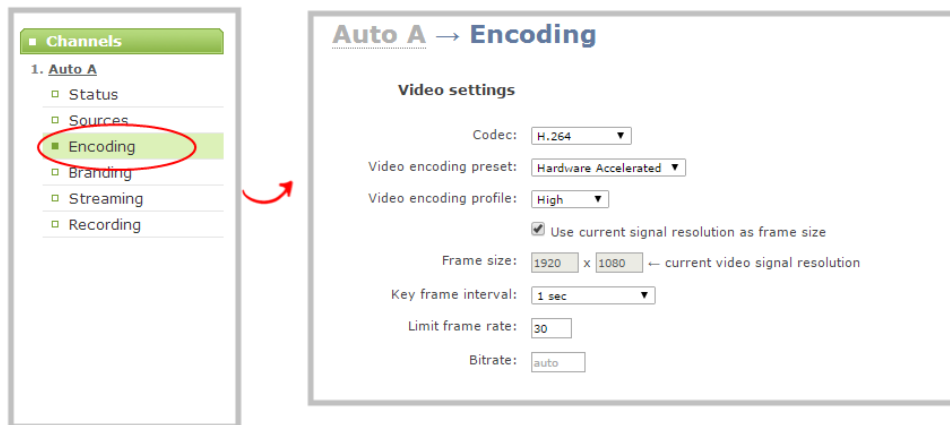
- [Configure video codec](#)
- [Configure frame size](#)
- [Fine tune stream settings](#)

- Configure audio codec
- Codec and file format compatibility

Configure video codec

To configure encoding:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click the **Encoding** link for your channel; the encoding configuration page opens.



3. Click the **Codec** drop-down menu to change the size and speed of the compression and decompression and the quality of the image. Choose one of the following options from the **Codec** drop-down menu.

Value	Description
H.264	H.264 is the default value and provides high quality video while using low bandwidth. This is the preferred codec for the system.
Motion JPEG	This is suitable for live streaming and video, however may have low quality images while using high bandwidth. Motion JPEG does not support audio.
MPEG-4	This may be suitable for presentations. Provides good image quality, while using moderate bandwidth.


4. If the selected codec is Motion JPEG, you can configure the **Page refresh time**. Specify a time in a seconds.
5. If the selected codec is H.264 (default), click **Video encoding preset** to define how the video stream is encoded. Choose one of the following:

Value	Description
Hardware	This is the default H.264 encoding preset. Choose this setting for best

Value	Description
Accelerated	performance.
Software	This matches the default from previous generations of Epiphan products. Choose this only if you need software encoding or X.264 encoding to match results created with previous generations of Epiphan products or firmware.

- If the selected codec is H.264 (default), click **Video encoding profile** to limit or include video formats that are supported. Choose one of the following:

Value	Description
Baseline	Choose this option when streaming to an application that requires robustness and cannot tolerate data loss, for example video-conferencing.
Main	Choose this option for standard-definition broadcasts. This is the default.
High	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.



Video encoding profile and preset can be set only when the H.264 codec is selected.

- If all your changes are complete, scroll to the bottom of the page and click **Apply**.

Configure frame size


By default, for channels with only one layout and when that layout has only one video source, your Pearl automatically uses the incoming source frame size as the stream frame size. Frame size greatly affects the amount of bandwidth needed to transmit your stream. The larger the frame size, the more bandwidth you need to stream it. So you may want to keep the frame size the same as your source, or you may want to apply upscaling, downscaling, stretching, or black bar framing, depending on your needs.

For example:

- if the input signal resolution is 1920×1080 (a 16:9 aspect ratio)
- and stream frame size is set to another 16:9 frame size such as 1280×720,


the smaller stream frame size causes the system to downscale the image and use less bandwidth to transmit.

Or if you have a widescreen/HD format source but need a 4:3 output frame size, you can add black bars to the top and bottom of the frame.

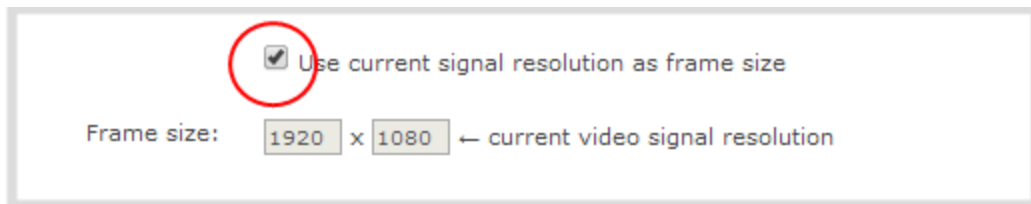
 The system is designed to provide scaling, however for the best overall system performance (particularly when reaching maximum system capacity), configure your source to provide the correct frame size and avoid scaling.


To configure your stream's frame size:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click **Encoding** for the your channel; the encoding configuration page opens.
3. Scroll to the **Frame size** section.
4. Perform one of the following steps:

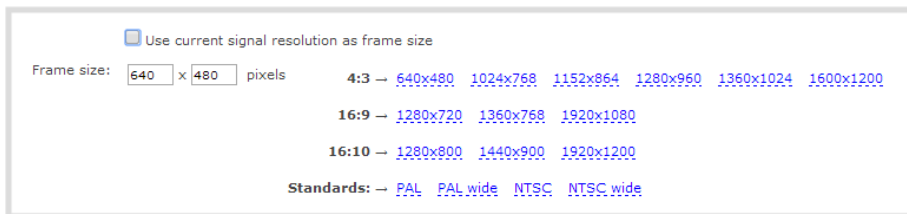
 Using current signal resolution as the frame size only works for channel layouts with a single source. If you're using multiple sources, follow the steps below to set your frame size.

- a. Check the **Use current signal resolution as the frame size** check box. Enabling this feature greys out the other frame-size configuration fields. The system automatically streams at the frame size of the input signal.





 If you change the frame size (resolution) of the input signal after streaming (or recording) begins your may see interrupted streaming and recording. Enabling this feature is not recommended for systems where input resolution is changed frequently.

- b. Change the frame size, follow the steps below.
5. Set the **Frame size** values to reflect the dimensions required for your stream. Some suggested values cover popular resolutions of cameras and display devices such as monitors, but you may also specify something custom:




- a. Uncheck **Use current signal resolution as frame size**.
- b. Type a frame size in the field; or
- c. Select an option from the sizes shown, the dimensions will appear in the frame size field.

 Scaling occurs automatically (no extra configuration needed) when you make the dimensions larger, smaller, or a different aspect ratio than the source.

 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 to the top and bottom or left and right sides to make up the difference. See **Remove black bars (matte) from the video**.

6. If all your changes are complete, scroll to the bottom of the page and click **Apply**.

 If you plan to use layout switching during a live stream, it's best to choose a fixed layout size. This avoids causing the stream restart due to frame size change when you switch between single-source layouts that use frame sizes.

Fine tune stream settings

Along with video/audio codecs and frame size, there are other configurable stream settings that affect quality and bandwidth. Like with frame size selection, values for these settings can be a tradeoff between bandwidth available and quality for stream viewers.

A table at the end of this section provides additional guidance for the settings

To fine tune your stream's settings :

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click **Encoding** for your channel; the encoding configuration page opens.
3. Scroll to the **Key frame interval** setting.

4. Click the **Key frame interval** drop-down box to choose how often a key frame (a frame that contains all the pixels) is sent when streaming the video. The longer the key frame interval the smaller the video file size, and vice versa.
5. If desired, 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.
6. If using H.264 or MPEG4 video codecs, 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.
7. If all your changes are complete, scroll to the bottom of the page and click **Apply**.

Table 28 Stream settings guidance

Key frame interval	<p>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.</p> <p>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.</p>
Frame rate	<p>Frame rate reflects the number of images captured by the device per second. Reducing the frame rate reduces bandwidth usage, and vice versa.</p> <p>The system's ability to maintain a set frame rate is based on several factors, for example:</p> <ul style="list-style-type: none"> • 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.

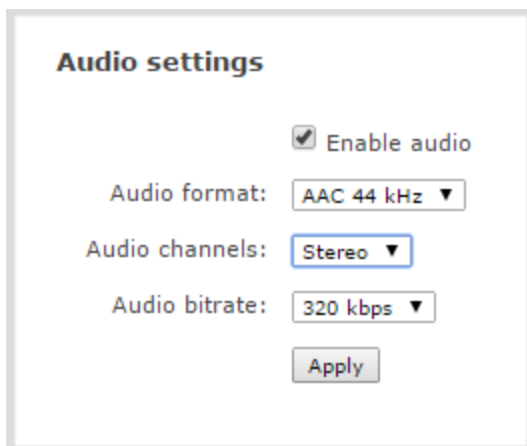
	When adjusting the frame rate, you may need to try different values to achieve the best outcome.
Bitrate	<p>In general, higher bitrate mean higher image quality in the stream, at the cost of higher bandwidth needed to transmit it.</p> <p>For comparison against something you are likely familiar with, an HD Blu-ray video is typically in the range of 20 mbps, standard-definition DVD is usually 6 mbps.</p> <p>If you don't know what value to use, a good place to start is 5000 kbps (slightly less than a typical DVD). Test to see how this works for your viewers and adjust.</p>

Configure audio codec

If your channel sources included audio (see [Create a simple channel](#) or [Create a custom channel](#)), your stream will by default use the AAC audio codec at 48 kHz. You can modify this setting to best match your streaming or post-processing needs.


To configure your stream's audio codec :

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click **Encoding** for the your channel; the encoding configuration page opens.
3. Scroll to the **Audio settings** section.




4. Ensure the **Enable audio** checkbox is checked.

- If the default audio format AAC 44KHz, stereo, 320 Kbps is not desired, click the **Audio format** drop-down menu to select an audio codec. A table at the end of this procedure gives details about each option.
- Click the **Audio channels** drop-down menu to choose mono (1 channel) or stereo (2 channels).

 If desired, you can choose **Mono** to have left and right stereo channels combined and streamed together (i.e. when listening to the streamed audio, the same blended sound will come through both the left and right channels).

If you have only one mono analog input, use the left TRS 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.)



- Select an **Audio bitrate** from the drop-down menu. The table at the end of this procedure gives some guidance on [audio bitrates](#).

 For **stereo** audio, we recommend 256 kbps or 320 kbps.

- If all your changes are complete, scroll to the bottom of the page and click **Apply**.

Table 29 Audio codecs and bitrate guidance

Value	Description
AAC	<p>AAC is the default audio codec.</p> <p>This codec is comparable to MP3, and may have 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.</p> <p>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.</p> <p>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.</p>
MP3	<p>MP3 provides a common audio format for audio storage.</p> <p>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</p>

Value	Description
	<p>provides the best sound quality by avoiding audio resampling. For analog signals, 44 kHz provides higher sampling.</p> <div data-bbox="462 373 1446 548" style="border: 1px solid #ccc; background-color: #e6f2e6; padding: 5px;">  Flash (FLV) doesn't support 48 kHz MP3 audio. When selecting this value you'll need to use a media player (or install ASF browser plugins) to preview your channel. </div>
PCM	<p>Pulse Code Modulation (PCM) is a standard for digital audio in computer and other devices such as, digital telephone systems.</p> <p>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.</p> <div data-bbox="462 831 1446 1005" style="border: 1px solid #ccc; background-color: #e6f2e6; padding: 5px;">  Flash (FLV) doesn't support 48 kHz PCM audio. When selecting this value you'll need to use a media player (or install ASF browser plugins) to preview your channel. </div>

Codec and file format compatibility

Not all streaming and recording protocols support all combinations of video and audio codecs. Use the tables below to determine what settings work for your streaming and recording needs.

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

Video Codec selected	Audio Codec selected	RTSP	FLV	ASF	MPEG-TS	MJPEG
H.264	No audio codec	✓	✓	✓	✓	
H.264	PCM	✓	✓	✓		
H.264	MP3	✓	✓	✓	✓	
H.264	AAC	✓	✓	✓	✓	
MPEG-4	No audio codec			✓		
MPEG-4	PCM			✓		



Video Codec selected	Audio Codec selected	RTSP	FLV	ASF	MPEG-TS	MJPEG
MPEG-4	MP3			✓		
MPEG-4	AAC			✓		
MJPEG	No audio codec					✓

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

Video Codec selected	Audio Codec selected	MP4*	AVI	MOV	MPEG-TS
H.264	No audio codec	✓	✓	✓	✓
H.264	PCM	✓	✓	✓	
H.264	MP3	✓	✓	✓	✓
H.264	AAC	✓	✓	✓	✓
MPEG-4	No audio codec	✓	✓	✓	
MPEG-4	LPCM	✓	✓	✓	
MPEG-4	MP3	✓	✓	✓	
MPEG-4	AAC	✓	✓	✓	
MJPEG	No audio codec	✓	✓	✓	✓


* Both MP4 and MP4-Fragmented.

Add channel metadata

Adding company information to metadata is an easy way to identify and copy protect your broadcast or recording.

This section describes the following topics for customizing your channel:

- [Add channel metadata](#)
- [Remove metadata from a channel](#)

 Previous firmware versions gave the ability to configure "No Signal" images per channel. "No Signal" images are now done on a per-source basis instead . See [Add a No Signal image to a source](#)

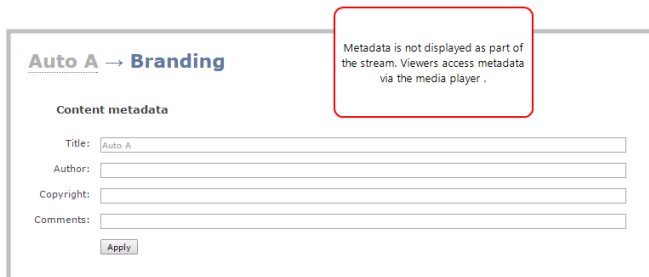
Add channel metadata

Using the Branding feature, you can apply a logo to your channel and specify the following meta data 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; and
- additional information about the broadcast, such as time of the broadcast, or change to the schedule.

To apply channel metadata:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, select a channel; the menu expands.
4. Click the **Branding** link for your channel; the Branding configuration page opens.



5. Enter metadata such as: presentation title, presenter name(s), any copyright dates and additional information about the broadcast that you want the viewer to know.

 How metadata is displayed depends 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 along the bottom of the media player window, similar to a ticker message bar.

6. Click **Apply**.

Remove metadata from a channel

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, select a channel; the menu expands.
4. Click the **Branding** menu option; the Branding configuration page opens.
5. Scroll to the **Content metadata** section.
6. Click the Author, Copyright or Comments field.
7. Highlight the text and press delete on the keyboard. The field is empty.
8. Click **Apply**.

Preview a channel

While configuring a channel, you may want to open a live preview of the channel in another tab or browser window so you can see the changes as they are applied. Choose one of the following options to preview your channel:

- [Preview a channel from the Info page](#)
- [Preview a channel from the Status page](#)
- [Preview all channels at once](#)

Preview a channel from the Info page

The system's Info page displays links for previewing your channel(s). This fast and simple method allows you to see link for all the streams in a single location.

To preview a channel from the **Info** page:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. From the web interface, click **Info** from the Configuration menu option; the information window opens



Pearl D569D134 info

Firmware
 Version: 3.15.1b
 Revision: 31252_1743
 Date: 2015-06-11

Hardware
 CPU board: D53427RIE (G87790-405)

Channels

#	Channel name	Status	Video source	Audio source	Stream	Bitrate	Actual bitrate	Frame size	FPS / Actual FPS	Port
1	Auto A	ok	Auto A	3 sources	H.264+AAC	auto	5558 kbps	1920x1080	30 / 30.0	8000 View
2	Auto B	ok	Auto B	3 sources	H.264+AAC	auto	6905 kbps	1920x1080	30 / 30.0	8001 View
3	Channel 3	ok	2 sources	No sources	H.264+AAC	auto	6166 kbps	1920x1080	30 / 29.5	8002 View

Overall system load: 51%

3. Scroll to the channel you want to preview.
4. Click **View**; the corresponding channel is displayed in the window.

Preview a channel from the Status page

The channel's status page gives a wealth of information about the channel, including bit rate, frame size, a snapshot of the channel and links to preview the channel.

To preview a channel from the Status page:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click the link for Channel you want to preview, the menu expands.
3. Click **Status**; the channel's Status page opens.

Channels

- 1. **HDMI-A**
 - Status**
 - Sources
 - Encoding
 - Branding
 - Streaming
 - Recording
- 2. **VGA-B**
- 3. **Channel 3**
- 4. **SDI-A**

[Add channel](#)

[Delete this channel](#)

Services state

Encoder: up 4:45:49
 Broadcaster: up 4:45:49
 HTTP Live Streamer: disabled
 Recorder: disabled

Stream info

Live broadcast: <http://192.168.0.183/preview.cgi?channel=1>

Video: H.264 1920x1080@30, 6.47 Mbps
 Actual framerate: 30
 Audio: AAC 44kHz stereo 320 kbps
 Total: 6.79 Mbps
 RTSP stream rtsp://192.168.0.183:554/stream.sdp
 MPEG-TS stream http://192.168.0.183:8000/stream.ts
 ASF stream http://192.168.0.183:8000/stream.asf
 Flash stream http://192.168.0.183:8000/stream.flv

4. Scroll down to see the snapshot.
5. Right-click the **Live Broadcast** link and select **Open in a new Tab** or **Open in a new Window**; a tab or window opens displaying a preview of the channel.

Preview all channels at once

Pearl has a special preview mode that lets you see all configured channels at once.



The resulting web page can be very large. You may wish to be aware of your web browser's zoom hot keys. Many browsers will zoom out with Ctrl-- (control minus) and zoom in with Ctrl+= (control equals).

To preview all channels at the same time:

1. Open a new browser window.
2. Type the following string into the address bar of your web browser on your admin computer (ipaddress is the IP address of your Pearl).

```
http://<ip address of Pearl>/preview.cgi  
For example: http://172.20.1.33/preview.cgi
```

3. Press **Enter**, the preview web page appears displaying the content of all active channels.

Rename a channel

By default, channels are created with the same name as their source - until a second layout or a second source is added to the channel, at which time the channel is renamed Channel X where X is the index of the channel. However there may be circumstances when you want to create a distinct name for the channel to reflect the source(s) it contains.



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 interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, scroll to the Channels menu option.
4. Click on the channel you want to rename; the menu expands.
5. Click any link for the channel; the corresponding channel status or configuration page opens.



You can change a channel's name from any of its configuration pages.

3. Click the channel name at the top of the channel configuration page; the name text becomes red to indicate that it is editable.
4. Highlight the old name and press backspace or delete on the keyboard.
5. Type the new name, using alphanumeric characters. It's recommended (but not mandatory) that you use underscores to separate words, if needed.
6. Press Enter on the keyboard. The name is updated at the top of the screen and in the list of Channels in the navigation menu.

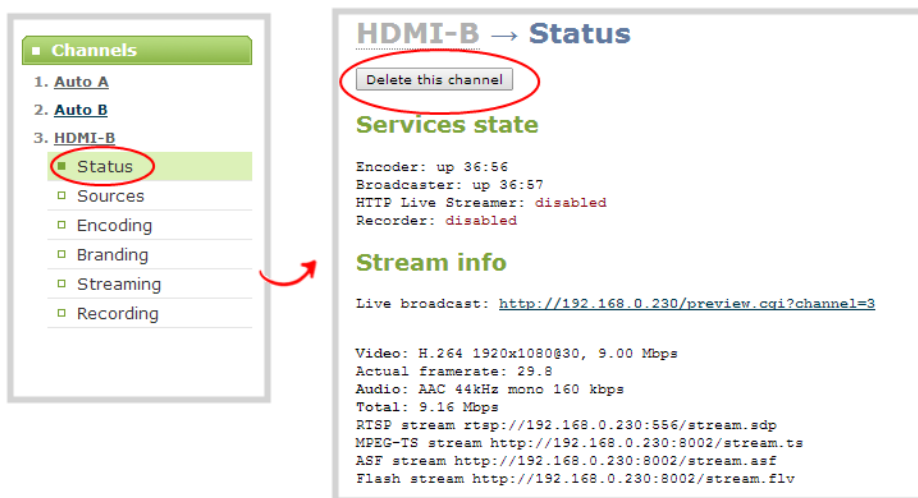
 You must press the Enter key on the keyboard for the change to take effect.

Delete a channel

From time to time you may want to clean up the list of channels, and remove channels that are no longer used. The following steps describe how to delete a channel. Deleting a channel does not delete the input source configuration, however it deletes any recorded files for the channel.

To delete a channel, follow the steps below.

1. From the web interface, scroll to the Channels menu option.
2. Click the channel you want to delete; the menu expands.
3. Click **Status**; the Status page opens displaying the service state and stream info for the channel.



4. Click **Delete this channel**; a confirmation dialog box appears to remind you that all recorded files for this channel will be removed.



You cannot undo this command.

5. Click **OK** to continue or **Cancel** to stop. If you proceed, a message indicating that the channel was successfully deleted appears at the top of the page.

Live video mixing / switching

Pearl supports live video mixing (also known as live video switching) while you are capturing, streaming and recording. Video mixing is a great way to create dynamic content for your viewers and recordings. With Pearl, switching happens in less than half a second (< 500 ms)!

This means you can start your stream with a video source showing a countdown, move to a single-camera view, then switch between multiple cameras or multiple layouts with more than one source, and end again with a thank you message for attendees. (Layout switches made in your channel are reflected in both the live stream and recording.)

For example, your stream could look like this:



Before you can switch between layouts, make sure you have your custom channel with layouts created. See [Create a custom channel or layout](#).

Now on to the fun part!

There are two ways to perform live switching. You can use either the web UI or the touch screen.

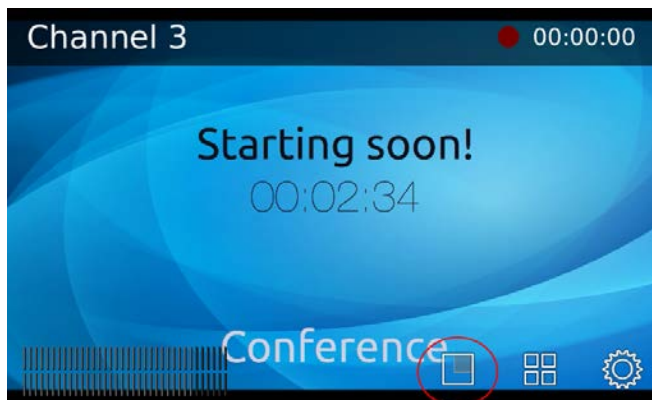
Switching / mixing using the touch screen

Switching live video inputs, or video mixing, is simple and intuitive using Pearl's touch screen. Simply scroll to the channel you want to work on, select the layout switching mode and apply the layout you want to use.

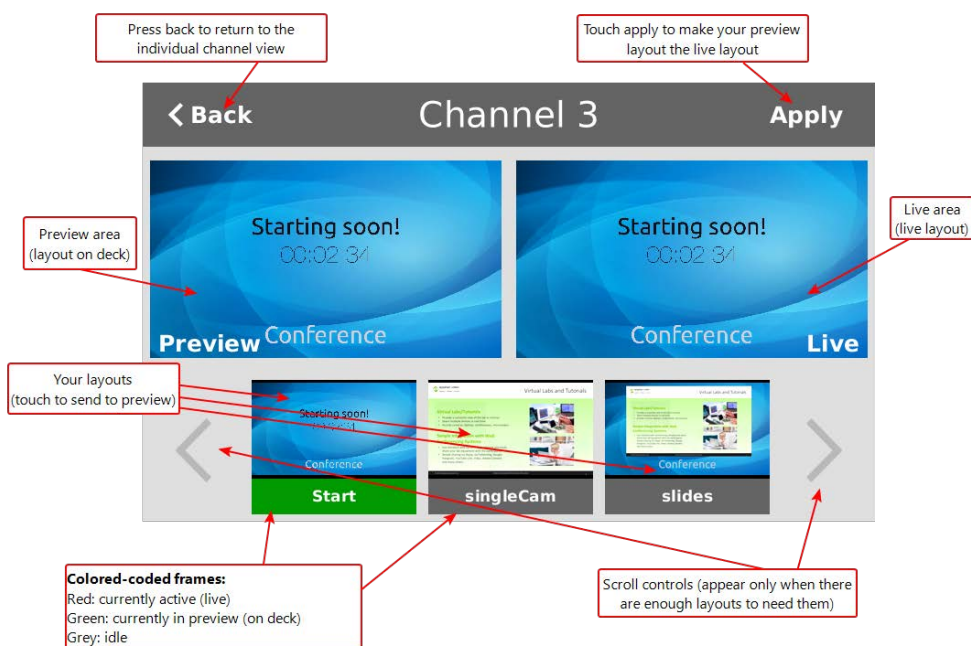
By default layout control is enabled for the touch screen, but it's possible your touch screen has been configured by the administrator to prevent layout switching, or even channel monitoring. If the instructions below don't work for you, see [Block \(or allow\) recording, streaming and switching from the touch screen](#) for details on enabling layout control by the touch screen.

To switch video using the touch screen:

1. If needed, touch the screen once to turn it on.
2. If needed, touch your channel in the grid view to change it to individual view.
3. If needed, touch the screen once to enable controls on the screen.



4. Touch the button to start layout switching mode; the screen changes to display your layouts.



5. Initially, your live layout (which is displayed on the right side) is the same as your preview, or on deck, layout. It appears in the list at the bottom with a green bar on the frame to show it is in preview. Touch any other layout; the touchscreen updates to show your new layout in preview.



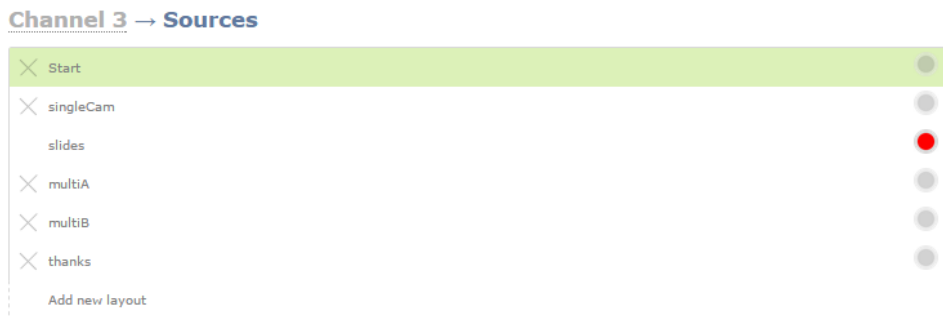
6. Both the live layout and the preview layouts update at a reduced frame rate to the live stream, but fast enough that you can see what is happening.
7. When ready, touch **Apply** to cause the layout currently in preview to become live; the switch happens and your screen is updated.
8. Continue to switch layouts as needed for the duration of your event or recording.
9. Touch **Back** to return to the individual view screen at any time or when you are done video mixing.

Switching / mixing using the web UI

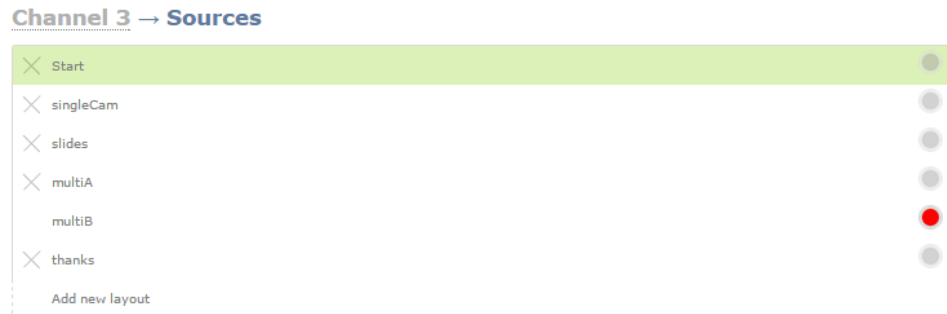
Switching live video inputs, or video mixing, is fast and easy using the web UI. For best results, you may wish to be in a location where you can see the live action, and have a solid understanding idea of what is in each of your layouts. Good layout names can help with this. See [Rename a layout \(custom channel\)](#).

To do live video mixing:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Follow the steps in [Custom channel layout editor](#) or [Create a custom channel or layout](#) to get to the channel layout editor.



3. The currently active layout has a red button in the rightmost column.
4. Touch the empty circle for another layout to make it the active layout; the layout changes in the live stream (and recording), and the new row gets the red button.



5. Continue to switch layouts as needed for the duration of your event or recording.

What is a source?

A source can be an image, video, or audio from a camera, a computer screen or any device that provides a VGA, SDI, DVI or HDMI video signal and audio signal output.

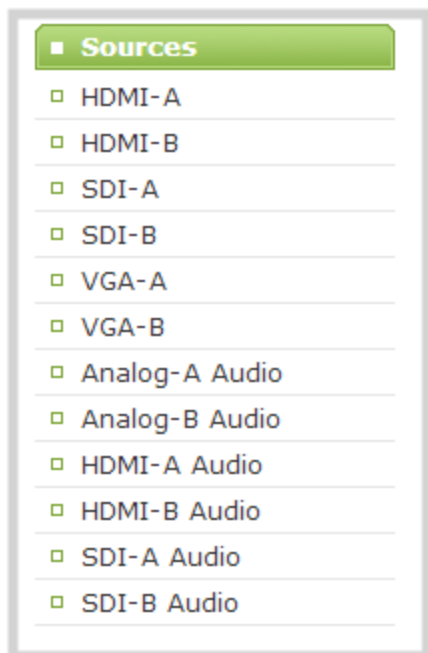
Video sources

The web interface automatically discovers all video source ports and displays them in the **Sources** section of the web admin interface.

Each video input on the back of the system is identified by its row (A or B) and input type (SDI, HDMI, or VGA). For example the SDI input from row A is labeled SDI-A. Input sources display their captured images at the bottom their respective source page. It is a good practice to view the images from each source to confirm what is captured. See below.

When a source is connected, the system automatically detects and adjusts the image capture settings at start up and continues to adjust every 60 seconds during operation (interval is configurable). The system's goal is to produce the best quality captured image given the source equipment used. Generally no further configuration is needed.

If there is no source connected to a specific port , then the default "No Signal" image will display in any channel where the source is used. You can use Pearl.'s default "No Signal" image for your sources, or you can create your own custom "No Signal" image for your channels to enhance branding and add professionalism to your display. See [Add a No Signal image to a source](#)



Audio sources

Pearl's web interface also automatically discovers all audio sources displays them in the same section. Audio sources are identified by the word audio in the source name. Audio input devices such as a microphone and portable music players can send audio signals to Pearl using the TRS audio input ports at the back of the system. Audio is also supported via HDMI and SDI.

This chapter covers the following sections:

- [Connect a source](#)
- [Preview a source](#)
- [Rename a source](#)
- [Control audio volume](#)
- [Confirm audio levels](#)
- [Add a No Signal image to a source](#)

Connect a source

You can connect sources to Pearl at any time, either before or after the system is powered on. Similarly you can disconnect a source from a port and even connect a different source at any time.



Changing the source connected to a port 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 the input sources to the following input ports on the system:

Table 30 Cable and port connections

Cable	Input Port
SDI	SDI port
VGA	VGA port
HDMI* or DVI	HDMI port
audio	Audio Input port

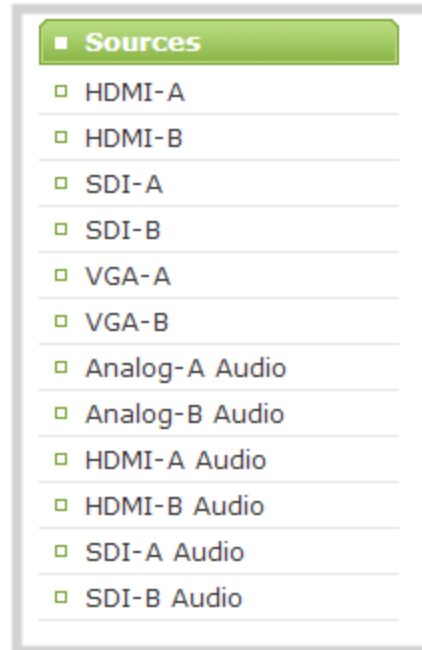
* Pearl only supports video and audio capture from HDMI content that is not HDCP-protected.

Preview a source

You can preview the images captured from your sources in the web admin interface. No extra configuration is needed.

To preview the captured stream/images:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. Ensure a source is connected to the input port, see [Connect a source](#).
4. From the web interface, click the **source name** from the Sources menu; the source configuration page opens.



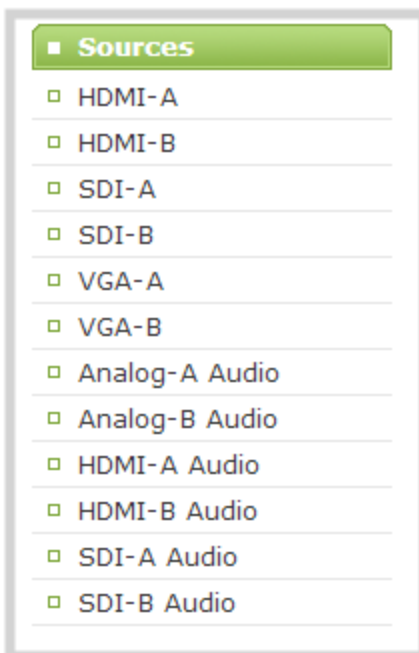
5. Scroll to the bottom of the source configuration page to see the **preview**.

Configure a source

Generally the captured stream doesn't require any additional configuration, but if needed, you can log into the web interface to make configuration changes.

To configure a source:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. Ensure a source is connected to the input port, see [Connect a source](#).
4. From the web interface, scroll to the Sources menu option.



5. Click the HDMI, SDI or VGA source link; the source configuration page opens.
6. If desired, scroll to the bottom of the source configuration page to see the video **Snapshot**.
7. Make note of the name of the source, or optionally, change the source name to reflect the data it is capturing. You'll need to know this name to add the source to a channel. See [Create a simple channel](#).
8. In most cases the video is ready to add to a channel and broadcast. If fine adjustments are required, refer to the table below to make minor configuration changes. (The only configurable item for SDI and HDMI sources is rotation.)

DVI and HDMI signals

The following options are available for DVI and HDMI signals via the HDMI port.

Value	Description
Rotate	<p>This feature is useful when a source captures video that is rotated 90° or is displayed upside down. Choose one of the following values to change the video orientation while streaming:</p> <ul style="list-style-type: none"> • No rotation • 90° clockwise • 90° counter clockwise • 180°

Value	Description
Enable deinterlacing	Enable this feature to convert an interlaced source signal to a non-interlaced signal.

VGA signals

The following values are configurable for VGA signals coming in via a VGA port.

Value	Description
Autoadjustments interval (sec)	When a source is setup, the system automatically detects and adjusts the image capture settings at start up and continues to adjust every 60 seconds during operation. To change the number of seconds between update, enter a value, or 0 to disable the feature, otherwise the default of 60 seconds is set.
Vertical shift	When an image is not aligned in the window, use this feature to move an image up or down on the screen. The values range from 20 (moves the image up) to -20 (moves the image down).
Horizontal shift	When an image is not aligned in the window, use this feature to move an image left or right on the screen. The values range from -999 (moves the image to the left) to 999 (moves the image to the right).
Phase	Specifies phase adjustments for VGA signals. Generally not used unless value is provided by Epiphan support.
PLL adjustment	Changing the value adjusts the horizontal resolution of the image. Adjust the value using small increments until the image is sharper. The value ranges from 0-999 to 999.
Offset	The Offset and Gain parameters function as contrast control for an image. The Offset controls the darker parts of the image and the gain controls the bright parts of the image. Adjust both values to optimize image quality. Adjust the values using small increments until the image is sharper. If you set Offset to a high value, set a high value for the gain to balance the two.
Gain	The Gain and Offset parameters function as contrast control for an image. The Gain controls the bright parts of the image and Offset controls the darker parts of the image. Adjust both values to optimize image quality. Adjust the values using small increments until the image is sharper. If you set Offset to a high value, set a high value for the Gain to balance the two.
Aspect Ratio	Sets the aspect ratio of the captured image. The default is 4:3. Set the value to

Value	Description
	Wide mode when capturing images that have a wide aspect ratio. Using the incorrect setting causes the image to be distorted or stretched. Configurable for VGA sources only.
HSync threshold	Adjust horizontal sync detection.
VSync threshold	Adjust vertical sync detection.
Rotate	This feature is useful when a source captures video that is rotated 90° or is displayed upside down. Choose one of the following values to change the video orientation while streaming: <ul style="list-style-type: none"> • No rotation • 90° clockwise • 90° counter clockwise • 180°

SDI signals

The following options are available for signals via the SDI port.


Value	Description
Rotate	This feature is useful when a source captures video that is rotated 90° or is displayed upside down. Choose one of the following values to change the video orientation while streaming: <ul style="list-style-type: none"> • No rotation • 90° clockwise • 90° counter clockwise • 180°
Enable deinterlacing	Enable this feature to convert an interlaced source signal to a non-interlaced signal.

Add a No Signal image to a source

By default the system displays a gray background with the text No Signal when there is no video signal coming in to a source. 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.

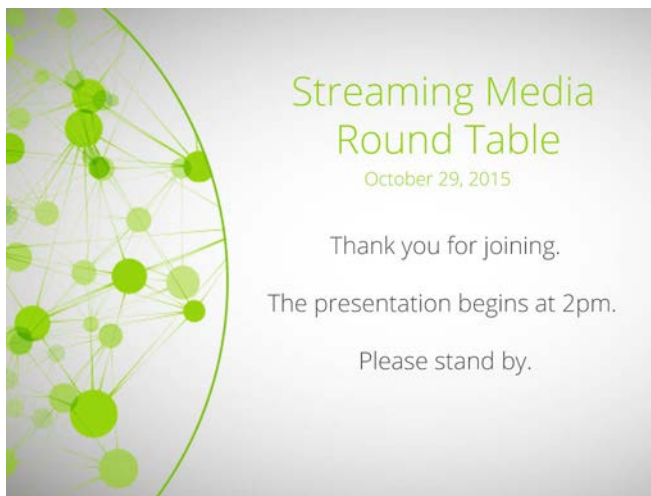
Before you can specify a custom no signal image for a source, you must upload it following the procedure **To upload an image**.

 Transparent PNGs are not a supported file type for "No Signal" images.

To set the no signal image for a source:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. Follow the instructions above ([To upload a logo to a channel](#)) to upload an image via the **Branding Content** page.
4. From the web interface, select your desired source under the **Source** header; the source configuration page opens.
5. Select a "No signal" image. This image displays in the channel when the source's signal is not detected. (If your uploaded image does not appear in the list, ensure it doesn't exceed the maximum file size of 3840x2160.)

Alternatively, to select an image you can simply drag and drop your chosen picture file to the blank space below the Image field.



6. 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.
7. Click **Apply**.
8. Test that the No Signal image is correctly applied by disconnecting your source and previewing the channel(s) containing said source. See [Preview a channel](#) for more information.

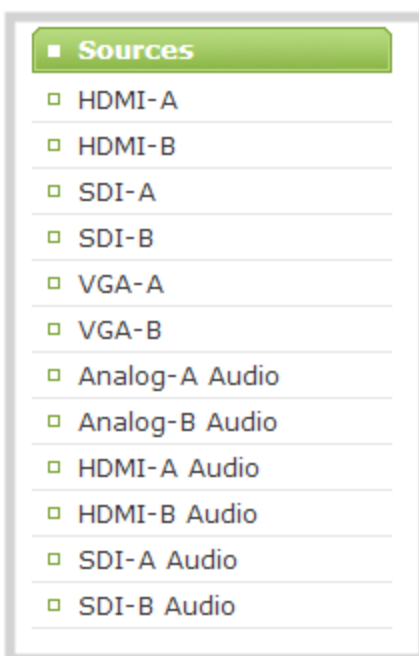
Rename a source

Source names are used when adding sources to channels, therefore it is important that you know the name of the source you wish to use. If a channel has only one source, the channel name will by default be the same as its source name and will update automatically when the source name changes.


Sometimes it's helpful to configure the source name to match the data it's capturing so it's clear what the channel is capturing too. Alternately you can change the channel's name. See [Rename a channel](#).

To change a source name:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, scroll to the Sources menu option.



4. Click the HDMI, SDI or VGA source link; the source configuration page opens.
5. Click the **source name** at the top of the page; the name turns red.
6. Highlight and delete the existing **source name**.
7. Type a new source name.
8. Press **Enter** (on your keyboard) to save the new name.

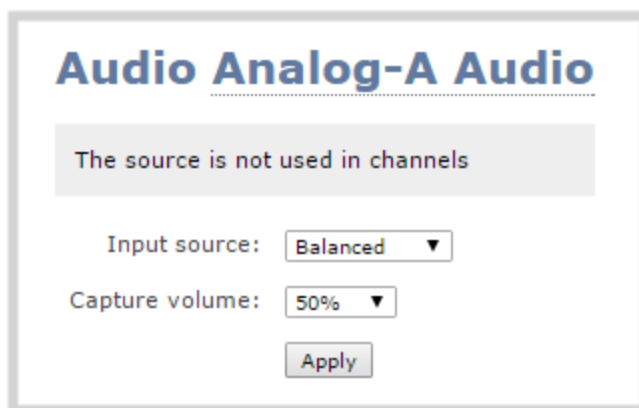
 You must press Enter to save the new name. The **Apply** button will not save the source name change.

Control audio volume

Do you find the volume is too high or too low for some of your audio sources? You can control the volume level for audio inputs via the web admin interface.

To set audio volume:

1. Ensure an audio input source is connected to an audio input port.
2. Connect to the admin interface using your preferred connection method. See [Connect to the admin interface](#).
3. Login as admin.
4. From the web interface, scroll the **Sources** section.
5. Select an audio source; the audio configuration page opens.



Audio Analog-A Audio

The source is not used in channels

Input source:

Capture volume:


6. For Analog audio sources (TRS), select an Input source from the drop-down menu.
7. Choose **Balanced** (the default selection) or **Unbalanced**. Consult the documentation for your audio source if you're unsure as to which type of audio it outputs.

Balanced outputs are typically used in professional broadcasting equipment, and the corresponding balanced cables help keep your high-gain signal noise-free. On the other hand, **Unbalanced** connections are generally for situations where there are relatively short cable runs such as in home studios or stage rigs, as unbalanced cables are not effective at suppressing noise from outside interference.



Balanced connections are the ideal choice for use in professional settings because you will have the best immunity from interference and outside noise sources.

- Click the **volume** drop-down menu. This is probably best thought of as input gain or sensitivity instead of volume. Choose to amplify the volume by a percentage of the original volume. The default setting is 50%. Decrease the percentage if the output volume is too loud. Increase the percentage if the output volume is not loud enough.

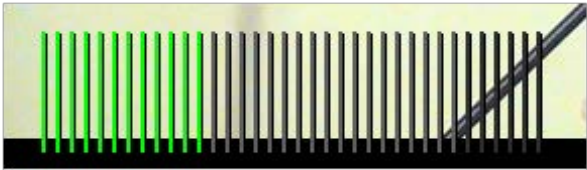

 Adjusting the **Capture volume** adjusts the recorded and streamed output audio.

- Click **Apply**.

Confirm audio levels (via the touch screen)

The touch screen includes an audio meter that indicates audio levels (if any) for each channel. This meter is visible in both the grid and individual channel view, at the lower left corner of the channel preview. You may need to touch the screen once to turn on decorations before you can see the audio meter.

If the channel has stereo audio, the meter is split horizontally into two bars. The top bar is the left channel and the bottom bar is the right channel.

<p>VU Meter (mono audio)</p>	
<p>VU Meter (stereo audio)</p>	

To confirm audio signal through the touch screen:

- If needed, touch the screen once to turn it on.
- View, from either the grid view or the individual channel view, the colored VU audio meter in the lower left quadrant of each channel preview.



Table 31 Touch screen audio VU meter levels

Color	Decibel range
Green	-60 dB to -10 dB
Yellow	-10 dB to -4 dB
Red	-4 dB to 0 dB

Troubleshoot capture

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.



Changing how source images are displayed may cause undesired results, for example experimenting with the PLL setting may result in the image not being displayed properly. It is a good practice to backup your configuration settings so that you can revert back to a good configuration if the changes that you made are not desirable. See **Configuration presets**.

The following topics are covered in this section:

- Remove black bars (matte) from the video
- Force the capture card to use a specific EDID
- Unstretch the output video
- Video not centered (VGA sources only)
- Remove the combing effect on images
- Video looks squished (VGA sources only)
- Video too bright, too dark or washed out (VGA sources only)

Remove black bars (matte) from the video

By default, for channels with only one layout and only one source, Pearl makes sure that the aspect ratio of input signals is preserved 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. The color of the bars (matte) is defined by the Background color selected on the **Channel sources** page. See [Create a custom channel](#).

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.

If you are seeing bars on your image 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.
2. Stretch the image to fit the output frame size aspect ratio.

These two options are described below.

Match the output frame size to the aspect ratio of the source signal

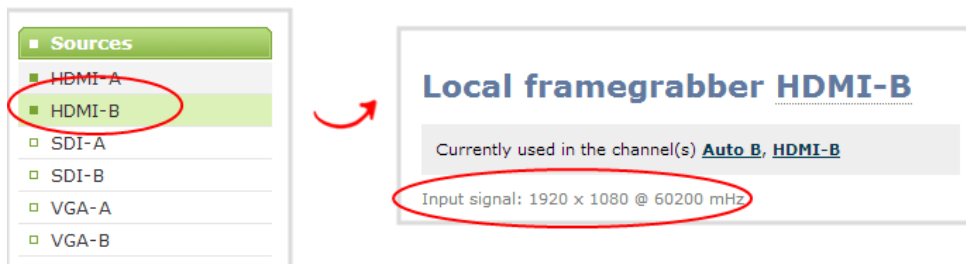


The frame size is matched only for layouts that have only one source. Note that if you have layouts with different frame sizes, switching them while live streaming will cause an interruption and restart of the stream. The same thing happens if you change the resolution of your source while streaming.

To change the output frame size on channels to match the aspect ratio of the source:

1. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).

2. Login as admin.
3. Select a channel; the menu expands.
4. Click **Sources**; the Sources page opens.
5. Find the name of the media source used for the channel.
6. Click this source under the **Sources** menu.



7. Make note of the input signal resolution.
8. Click the channel's **Encoding**; the Encoding page opens.
9. Scroll to the frame size parameter.
10. The simplest option is to select **Use current signal resolution** as frame size and click **Apply**. You can alternatively select it briefly to note the current video signal resolution, then deselect it and follow the steps below.



11. Look for the source aspect ratio in the list of aspect ratios provided.



- a. If the source resolution is on the list, choose another resolution on the same line (i.e. with the same aspect ratio).
- b. If the source resolution is not on the list, use a calculator to get a factor of the source resolution and enter it in the **Frame size** fields.

12. Click **Apply**.

Stretch the image

To remove the matte (black bars) by stretching the image to fit your output frame size:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select a channel; the channel menu expands.
3. Click **Sources**; the Sources page opens.
4. Click the row for your layout; the layout appears in the layout editor.
5. Select the **gear** for your Item with your video source; the Source Settings box appears.
6. Deselect **Keep aspect ratio when scaling** in the Source Settings box.
7. Click and drag the source in the layout editor to stretch as desired to fill the frame.
8. Click **Save**.

Force the capture card to use a specific EDID

Extended display identification data (EDID) is data provided by a video display device (usually a monitor) to describe its capabilities to a video source (usually a graphics or video output card in a PC or another device). The video source uses the EDID to determine the capabilities of the monitor to determine the resolution, color depth and other settings that the monitor can support.



EDID is crucial for DVI sources but mostly ignored by VGA sources.


Like monitors, each video capture card in Pearl contains an EDID. When you connect a VGA or DVI video source (such as a laptop or video camera), this source sees Pearl's HD Encoder's capture card as a monitor and uses its EDID to negotiate which video signal to send.

Generally capture card's DVI input correctly emulates a monitor that supports your video source. However sometimes, particularly if your source uses a custom set of display properties, you need to help PearlHD Encoder by uploading a custom EDID to force the capture card to report that it emulates a resolution, color depth, etc needed by your laptop, camera or other video source.

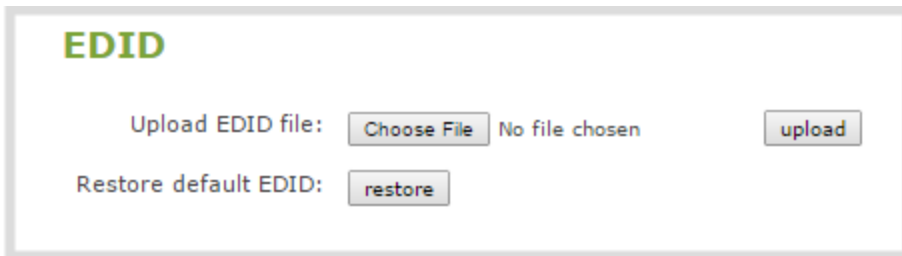
Upload a new EDID

In most circumstances the factory installed default EDID, is sufficient. However, there may be some cases where a video source uses resolutions that you do not want to use. In that case you can choose an EDID that forces Pearl's capture card to use a specific set of attributes.

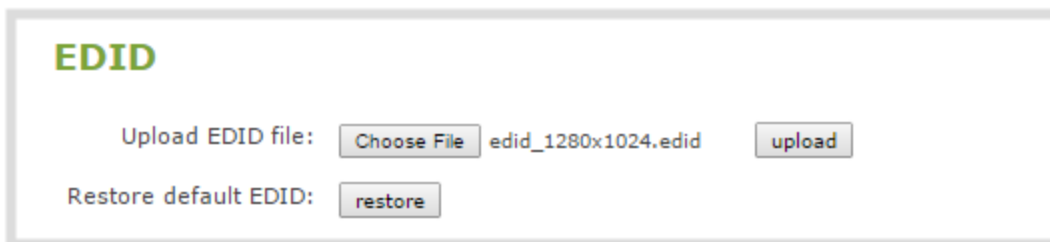
The uploaded EDID is permanently installed on your system and this capture card (a "Source" in the web interface) will always share the uploaded EDID with the connected video input source.

 EDID changes are permanent until you replace them with another EDID or specifically choose to restore the factory EDID for a given source. Not even a system-level factory reset removes the configured EDIDs.

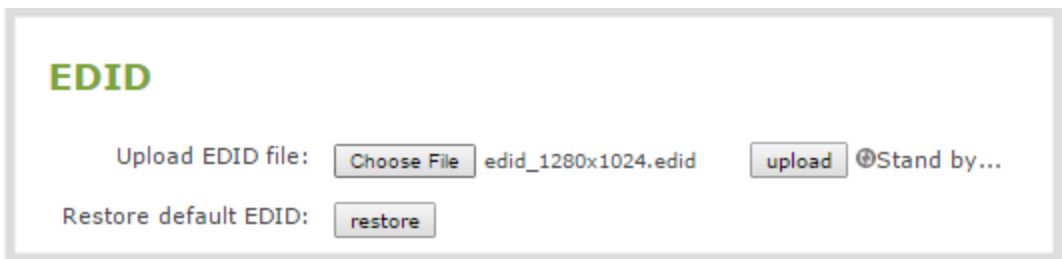
1. To download a new EDID file, go to the [Epiphan support](#) web page. The support page opens.
2. Select the support page for Pearl.
3. Scroll to the **EDID** section.
4. Click on an EDID from the list. The file is saved to your downloads folder on your hard drive.
5. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
6. Login as admin.
7. From the web interface, Scroll to the **Sources** section.
8. Click the name of the VGA or HDMI capture card (source) for which you want to upload an EDID; the Source Configuration page opens.
9. Scroll to the **EDID upload** section.



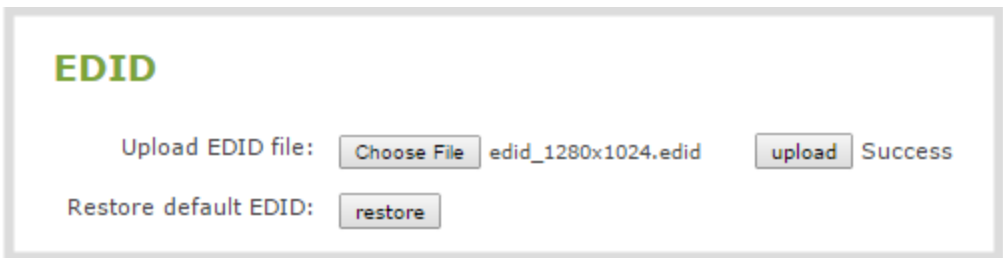
10. Click **Choose File**; a file browser opens.
11. Browse to the location where the custom EDID file was saved and select the file.
12. Click **open**; the EDID filename is displayed on the screen.



13. Click **upload**, the EDID upload begins; the screen shows a progress indicator.



14. When the upload is complete the page changes to reflect success or failure.

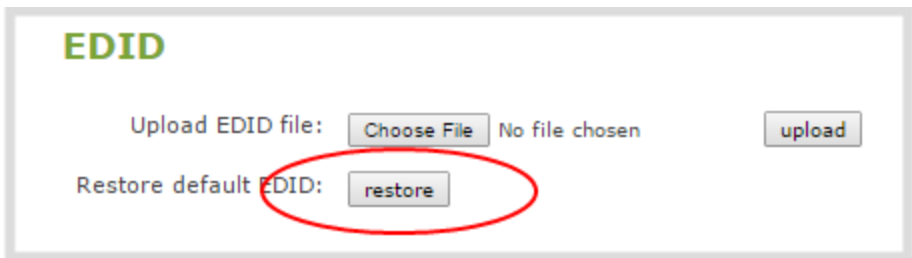


Restore factory default EDID

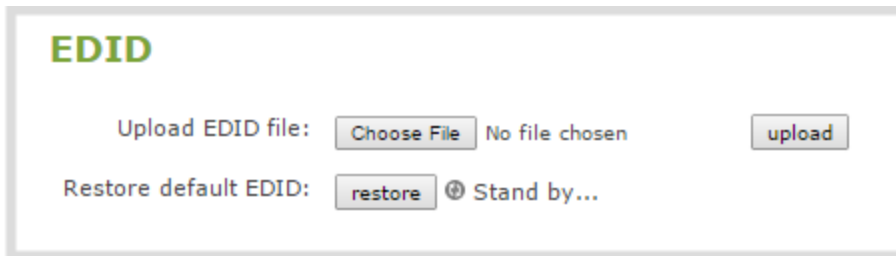
When you have finished with a custom EDID, you can restore the capture card (in the Sources list) to the default EDID. Currently there is no way to tell if your capture card is using a custom EDID. If you are unsure, restoring to factory default is the best approach.

To restore the default EDID:.

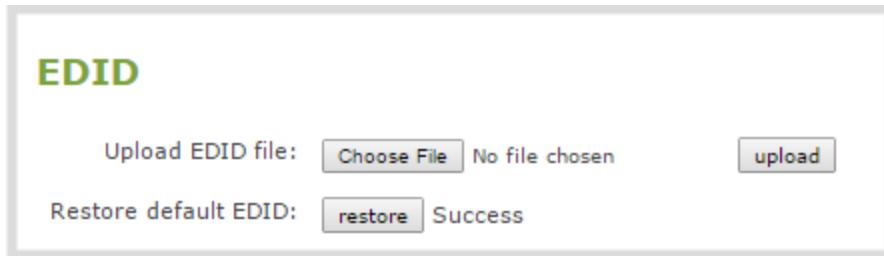
1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, scroll to the **Sources** section.
4. Click the capture card (source) for which you wish to restore the EDID; the source configuration page opens.
5. Scroll to the **EDID** section.
6. Click the restore button.



7. The screen updates with a status indicator.



8. When the EDID restoration is complete, the page updates to reflect the action is completed.

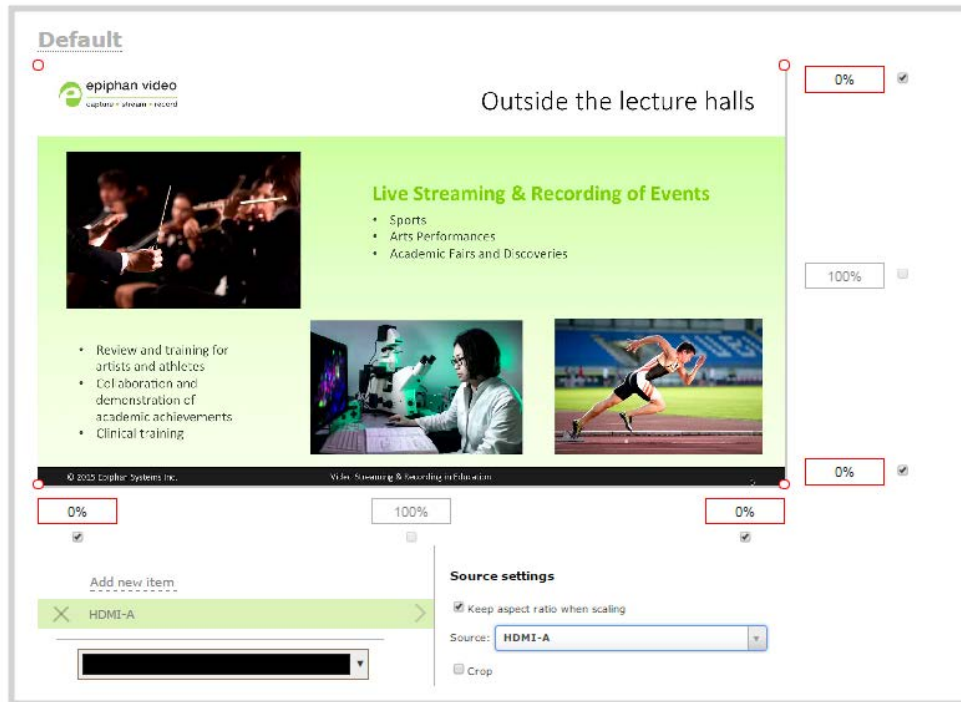


Unstretch the output video

By default, Pearl makes sure that the aspect ratio of input signals is preserved when the output is streamed. If this default was overridden the image is stretched to match the output frame size. The effect may be subtle and may not be problematic for you, but if you want to resolve this it is very simple to do.

To preserve the source aspect ratio:

1. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
2. Login as admin.
3. From the web interface, click **Encoding**; the encoding page opens.
4. Click **Sources**; the Sources page opens.
5. Click the row for the layout you want to edit; the layout editor opens.
6. Select the gear icon for your source from the list of layout items; the **Source settings** box appears.
7. From the **Source settings** box, make sure **Keep aspect ratio when scaling** is selected.



8. Scroll to the bottom of the page and click **Save**.



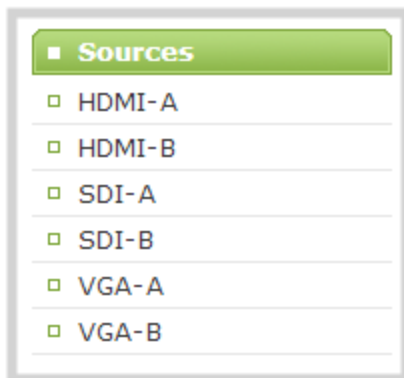
Unstretching the image causes a matte (black bars) to appear on the sides or top and bottom of the output. To remove these see **Remove black bars (matte) from the video**.

Video not centered (VGA sources only)

The image from the source is displayed too high or low, or too far to the left or right.

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).

- From the web interface, scroll to the Sources menu option.



- Click the desired video source ; the source configuration page opens.
- To move the video horizontally to the left or right, scroll to **Horizontal shift** .
- Enter incremental values to shift the video image to the left (use a negative value) or right (use a positive value).



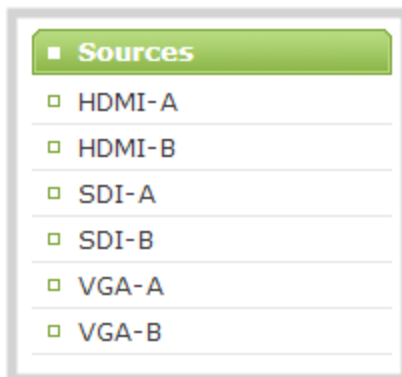
- Click **Apply**. View the output in the Snapshot preview below . You may need to make further adjustments to move the video left or right.
- Make further adjustments and click **Apply** after each change to confirm the results.
- To move the video up or down, scroll to **Vertical shift** .
- Enter incremental values to shift the video image down (use a negative value) or up (use a positive value).
- Click **Apply**. View the output in the Snapshot preview below. You may need to make further adjustments to move the video up or down.

Remove the combing effect on images

When frames are interlaced, artifacts from one frame may appear on the next frame. This occurs 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 interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, scroll to the Sources menu option.



4. Click on the desired video source ; the source configuration page opens.
5. Enable the **Enable deinterlace** setting.
6. Click **Apply**. View the output in the Snapshot preview below.

Video looks squished (VGA sources only)

The image is squeezed horizontally on the screen. This distortion occurs when there's a mismatch between the aspect ratio Pearl detects and the aspect ratio that is sent from the source signal. To compare the two signal values, you must know the aspect ratio that the source is sending.

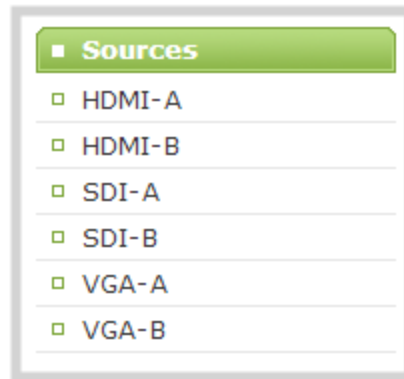
1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click **Info**; the info window opens with a list of all configured channels.

Channels										
#	Channel name	Status	Video source	Audio source	Stream	Bitrate	Actual bitrate	Frame size	FPS / Actual FPS	Port
1	Auto A	ok	SDI-A	SDI-A Audio	H.264+aac	5000 kbps	578 kbps	1920x1080	30 / 29.9	8000 View
2	Auto B	ok	SDI-B	SDI-B Audio	H.264+aac	5000 kbps	421 kbps	1920x1080	30 / 30.0	8001 View

Overall system load: 32%

4. Compare the aspect ratio from the source with the aspect ratio from the Pearl info window. Confirm if there is a mismatch.
5. If there is a mismatch, go to the Encoding page for the channel and change the frame size to match the frame size that is sent from the source. See [Configure encoding](#).
6. If the video is still squeezed horizontally on the screen, follow the steps below.

- From the web interface, scroll to the Sources menu option.



- Click on the source for which you want to change the aspect ratio; the source configuration page opens.
- Scroll to the Aspect ratio setting.
- Select **Wide mode** from the drop-down menu, when the source is wider than what is being displayed in the preview or Live View.
- Click **Apply**. View the output in the Snapshot preview below.

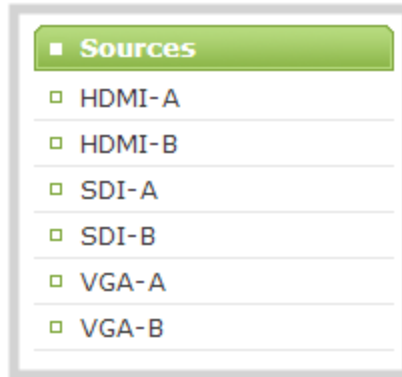
Video too bright, too dark or washed out (VGA sources only)

If the video from the source is too light, too dark or washed out, use the offset and gain controls together to optimize image quality. Increasing the gain amplifies weak signals but also increases noise, you must balance offset and gain values to achieve the best quality image.

Adjust these settings by the smallest values possible; compensate for a large change to one by making a large change to the other. Setting both offset and gain to high values can result in poor video quality.

- Login to the admin interface as **admin**. See [Connect to the admin interface](#).

- From the web interface, scroll to the Sources menu option.



- Click the desired video source; the source configuration page opens.
- Scroll to **Gain**.
- Enter a small value, for example 1 to 25 in the field to brighten the image.
- Scroll to **Offset**.
- Enter a small value, for example 1 to 15, to balance the gain setting . The Offset value behaves as a contrast to the Gain value.
- Click **Apply**. View the output in the Snapshot preview below. You may need to make further adjustments to fine tune the brightness and contrast.

PART 3: Stream

Streaming provides powerful and flexible approaches to delivering to your users. Offering an easy to use interface, users can stream video using multiple formats to multiple users and devices such as web browsers, media players, set-top-boxes, Smart TVs and Content Distribution Networks.

The system is flexible and supports standard codecs used by most sharing destinations and media players.

This section discusses the following topics related to publishing your content:

- [What is streaming?](#)
- [Stream to viewers](#)
- [Stream to a server](#)
- [Stream to a media player](#)
- [Samples of stream settings](#)

What is streaming?

After you have configured your media and channels, decided on the content and layout of your broadcast, it's time to share your stream.

Pearl provides a number of options for streaming. Choose from methods for unicast, multicast, CDN, SAP, UPnP and more.

When streaming to a server, you can use Pearl's touch screen or web admin interface to control when streaming starts and stops.

The following sections provide a description of the available streaming options, insight into why you would choose each option, and procedures to stream your content using each option.

- [Choose a streaming option](#)
- [Supported streaming formats](#)

Streams for viewers:

- [Stream to viewers](#)
- [Disable \(and enable\) streams for viewers](#)
- [Restrict access to streams for viewers](#)
- [Stream content using HTTP or RTSP](#)
- [Configure HTTP and RTSP streaming ports](#)
- [Stream content using HLS \(HTTP Live Streaming\)](#)
- [Stream content using UPnP](#)

Stream to a server:

- [Stream to a server](#)
- [Stream to a CDN](#)
- [Stream content using multicast](#)

Stream to a media player:

- [Stream to a media player](#)

Choose a streaming option

Each method of streaming media has strengths and weaknesses depending on your audience location, hardware resources and bandwidth. To help you decide how to publish your content, you must first identify

the number of viewers and how viewers will access your content. Are you streaming live video, or recorded video. Do you need to stream the content to one client (peer-to-peer), deliver a single stream to multiple clients (multicast), or provide web-based streaming where multiple clients can access the broadcast (Content Distribution Network).

Your Pearl can stream to individual viewers through HTTP, HTTP Live Streaming, UPnP and RTSP and can also simultaneously stream to a server such as a multicast server or CDN.

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 used by your channel.

To view the video formats and standards specific to your selected codec:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Status**; the following page opens displaying the stream protocol that is supported based on the selected codecs.

```
Stream info  
  
Live broadcast: http://192.168.0.183/preview.cgi?channel=1  
  
Video: H.264 1920x1080@30, 6.47 Mbps  
Actual framerate: 30  
Audio: AAC 44kHz stereo 320 kbps  
Total: 6.79 Mbps  
RTSP stream rtsp://192.168.0.183:554/stream.sdp  
MPEG-TS stream http://192.168.0.183:8000/stream.ts  
ASF stream http://192.168.0.183:8000/stream.asf  
Flash stream http://192.168.0.183:8000/stream.flv
```

Copy, paste and share files and addresses with viewers



Stream to viewers

Streaming to viewers allows people to connect directly to your Pearl via their web browser or media player to view the live stream.

You can configure whether or not streaming is enabled for viewers. See [Disable \(and enable\) streams for viewers](#).

Publishing Options	Use this option to...
HTTP	Quickly stream content to viewers simultaneously. No set up is required. Pearl is ready to stream content as soon as it has power and a configured channel. No other settings are required. Your audience need only access the URL of the broadcast and they are instantly connected. This viewing 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. For more information about using a HTTP streaming, refer to Stream content using HTTP or RTSP .
RTSP	Quickly stream content to viewers. No set up is required. Pearl is ready to stream content as soon as it has power and a configured channel. No other settings are required. Your audience need only copy and paste the URL of the stream into a media player. For more information about using a RTSP and HTTP streaming, refer to 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 Live Streaming) . There is approximately a 30 second delay when streaming using HLS.



To stream video outside of your LAN, configure port forwarding on your router. Work with your Network Administrator on this task. Network configuration is beyond the scope of this guide.

Stream content using HTTP or RTSP

The quickest and simplest way to deliver your content is to send the broadcast's URL to your viewers. You can provide separate URLs for each channel being streamed.

The format of the URL provided to you by the admin interface depends on the method you used to access the system, either through network discovery using the serial number or IP address.



The system must be accessible on the viewer's LAN for the viewer to use access by serial discovery.



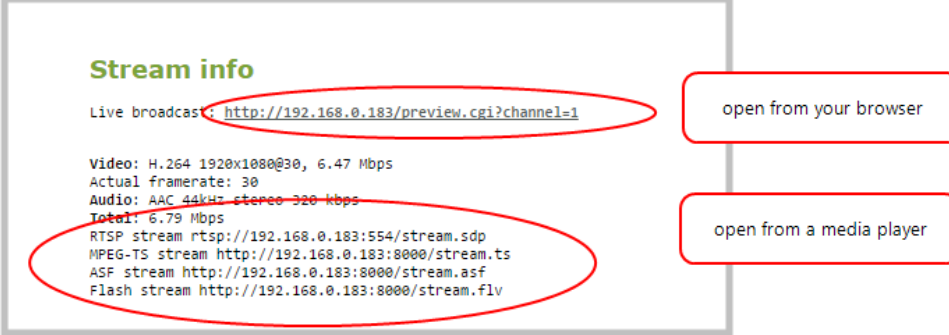
If your system is behind a firewall and you wish to share with remote viewers, you will need to set up port forwarding on your network. See your IT administrator.

Table 32 URL options

Access Method	URL Format
serial discovery	<div style="border: 1px solid #ccc; padding: 5px; background-color: #e6f2ff;"> <pre>http://<serial>.local/preview.cgi?channel=<channel number> rtsp://<serial>.local:<port>/stream.sdp</pre> </div> <p>Where serial is the serial number of the system and channel number is the provided from the GUI (see below).</p>
IP address	<div style="border: 1px solid #ccc; padding: 5px; background-color: #e6f2ff;"> <pre>http://<IP Address of Pearl>/preview.cgi?channel=2 rtsp://<IP Address of Pearl>:<port>/stream.sdp</pre> </div> <p>Where the IP address is the IP address of the system and the port and channel number information is provided on the channel's status page.</p>

To retrieve the stream URL for your viewers:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Status**; the following page opens displaying the stream protocol that is supported based on the selected codecs.



The screenshot shows a 'Stream info' page with the following text:

```
Live broadcast: http://192.168.0.183/preview.cgi?channel=1

Video: H.264 1920x1080@30, 6.47 Mbps
Actual framerate: 30
Audio: AAC 44kHz stereo 320 kbps
Total: 6.79 Mbps
RTSP stream rtsp://192.168.0.183:554/stream.sdp
MPEG-TS stream http://192.168.0.183:8000/stream.ts
ASF stream http://192.168.0.183:8000/stream.asf
Flash stream http://192.168.0.183:8000/stream.flv
```

Annotations include red ovals around the 'Live broadcast' URL and the 'RTSP stream' line, and red rounded rectangles with the text 'open from your browser' and 'open from a media player' pointing to the respective URLs.

5. Jot down the either the **Live Broadcast** , **RTSP stream** or other web streaming address. This is the address you can send to viewers or to create a link to your broadcast.



Users must install Bonjour Print Services on their Windows or Mac computer to access the live Preview using the serial number.



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

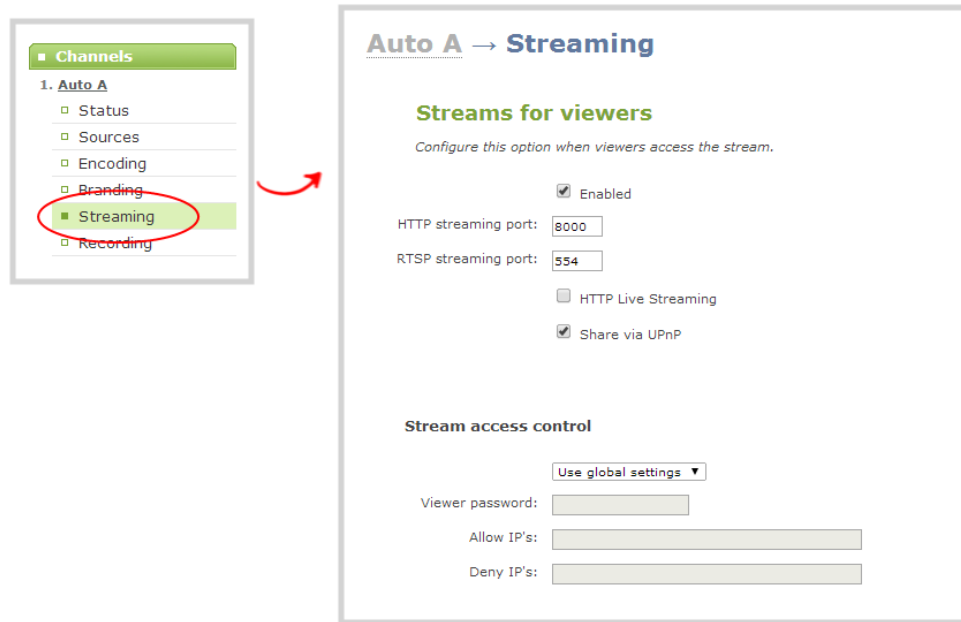
Configure HTTP and RTSP streaming ports

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, ASF 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 interface as **admin**. See [Connect to the admin interface](#).
2. From the web interface, click a **Channel**; the menu expands.
3. Click **Streaming**; the channel's Streaming page opens.



4. 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, ASF and MPEG-TS streams.



The port number must be higher than 500 for HTTP. In the case of RTSP streaming this value is ignored.

5. 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.
6. Click **Apply**.

Stream content using HLS (HTTP Live Streaming)

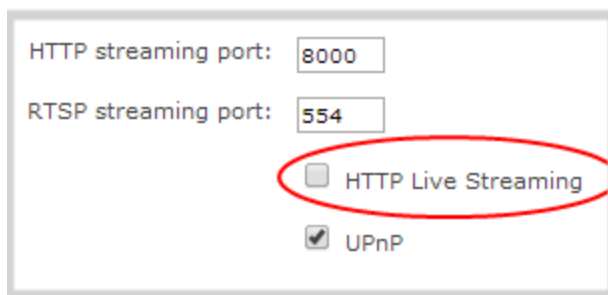
Stream live over the standard HTTP port 80, making it possible to cross firewalls and proxies that are normally accessible to other HTTP traffic .



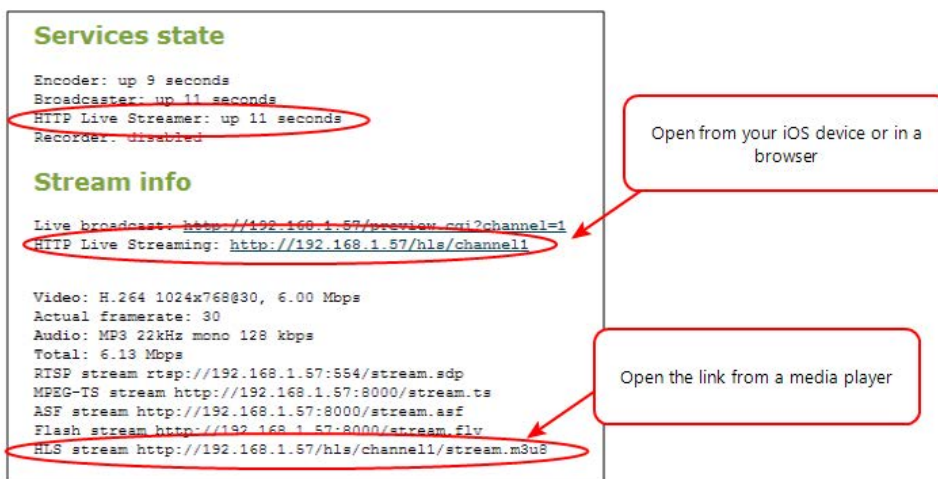
HLS is supported with the H.264 codec and MP3 or AAC audio encoding. When streaming using HLS there is approximately a 30 second delay.

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, select the channel containing video you want to stream; the menu expands.
4. Click **Streaming**; the channel's Streaming configuration page opens.

5. Enable HTTP Live Streaming by selecting the **HTTP Live Streaming** checkbox.



6. Click **Apply**.
7. Click **Status** for the channel. The status page opens.



8. Provide the HLS stream link to your viewers.

Send stream URLs to viewers

For participants to log in and view a stream, you must provide a stream URL. The URL that you send depends on the device the participant uses to view the stream. You can provide separate URLs for the stream coming from each channel, or one URL that includes all the streams for the channel.

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click the channel that you want to view; the menu expands.
4. Click **Status**; the Status page opens displaying the stream protocols supported based on the selected codecs. For more information on compatibility between codec and file formats, see [Supported streaming formats](#).

MPEG-TS: Used in broadcast systems such as DVB, ATSC and IPTV. It is supported by media players such as MPlayer, VLC and KMPlayer.

RTSP: Supported by most media players including QuickTime, MPlayer and VLC. Supports H.264 and MPEG4 standards and analog audio from an external source.

Stream info

Live broadcast: <http://192.168.0.174/preview.cgi?channel=1>

Video: H.264 1920x1080@30, 6.47 Mbps
Actual framerate: 15
Audio: AAC 44kHz stereo 320 kbps
Total: 6.79 Mbps
RTSP stream <rtsp://192.168.0.174:554/stream.sdp>
MPEG-TS stream <http://192.168.0.174:8000/stream.ts>
ASF stream <http://192.168.0.174:8000/stream.asf>
Flash stream <http://192.168.0.174:8000/stream.flv>

ASF: Supported on Windows Media Player. Additional codecs may be needed to view ASF streams. Supports H.264 and MPEG4 standards. Supports analog audio from an external source.

FLV: Supported on most web browsers and media players. Supports the H.264 standard and analog audio from an external source.

5. Copy the URL and provide to viewers.

Viewers may now view the stream using a digital media player or browser. See [Viewing with a web browser](#) and [Viewing with a media player \(RTSP\)](#).

View the Flash stream

There are two methods to view the retrieve the flash stream URL:

- Live broadcast link on the channel's status page.
- Info page from the configuration menu

View your broadcast using the View link on the Info menu

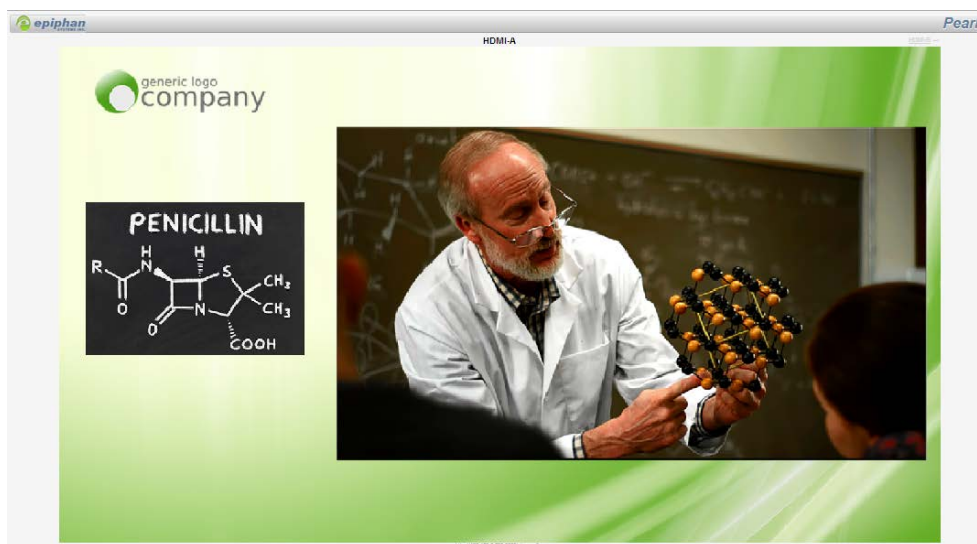
1. Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).

- From the web interface, click **Info** menu option; the info window opens with a list of all configured channels.

Channels										
#	Channel name	Status	Video source	Audio source	Stream	Bitrate	Actual bitrate	Frame size	FPS / Actual FPS	Port
1	Auto_A	ok	SDI-A	SDI-A Audio	H.264+aac	5000 kbps	578 kbps	1920x1080	30 / 29.9	8000 View
2	Auto_B	ok	SDI-B	SDI-B Audio	H.264+aac	5000 kbps	421 kbps	1920x1080	30 / 30.0	8001 View

Overall system load: 32%

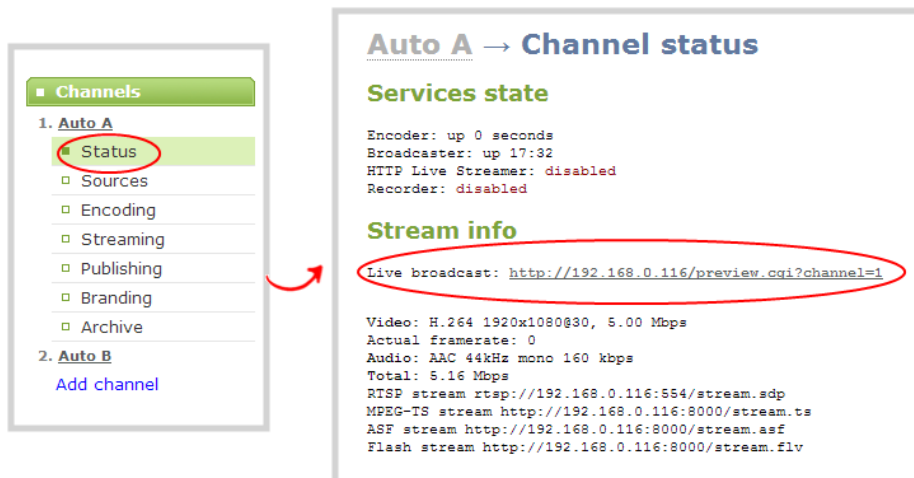
- Click on the channel you want to preview. A page opens displaying the live broadcast and broadcast URL.



- Copy the URL and provide to viewers.

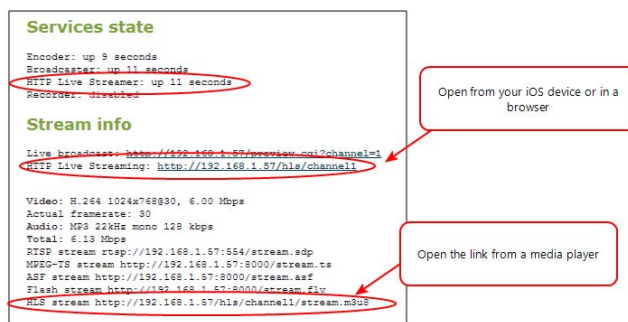
View your broadcast using the Live broadcast link on the Status page

- Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).
- From the web interface, click the channel that you want to view; the menu expands.
- Click **Status**; the status page opens displaying the live broadcast and stream URL.



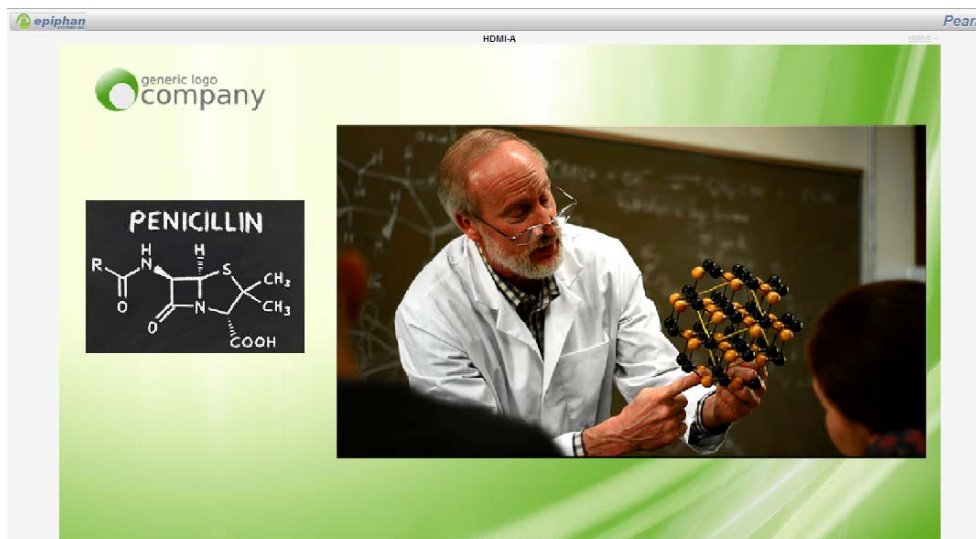
- 5. When HTTP live streaming for the channel is enabled the status page also shows the **HTTP Live Streaming** link. See, [Stream content using HLS \(HTTP Live Streaming\)](#).

When HLS is enabled and with no viewer password set, viewers can access the stream using a tablet or smart phone device. If the viewer passwords is set, HLS connections are not possible.



- 6. Click on the Live broadcast or HTTP Live Stream link, if it configured. The window opens displaying the live broadcast and broadcast URL.

Previewing the broadcast with FLV player results in moderate buffering delay (15-30 seconds).



7. Copy the URL and provide to viewers.

Viewing with a web browser

If a viewer password is configured, provide participants with the password to log in, along with the IP address or the URL to be used by the participant's browser.



If your channel is configured with 48 kHz audio, flash streaming (which is used for browser viewing) may not work. In this case, we recommend you view the channel with a media player instead. (See below.)

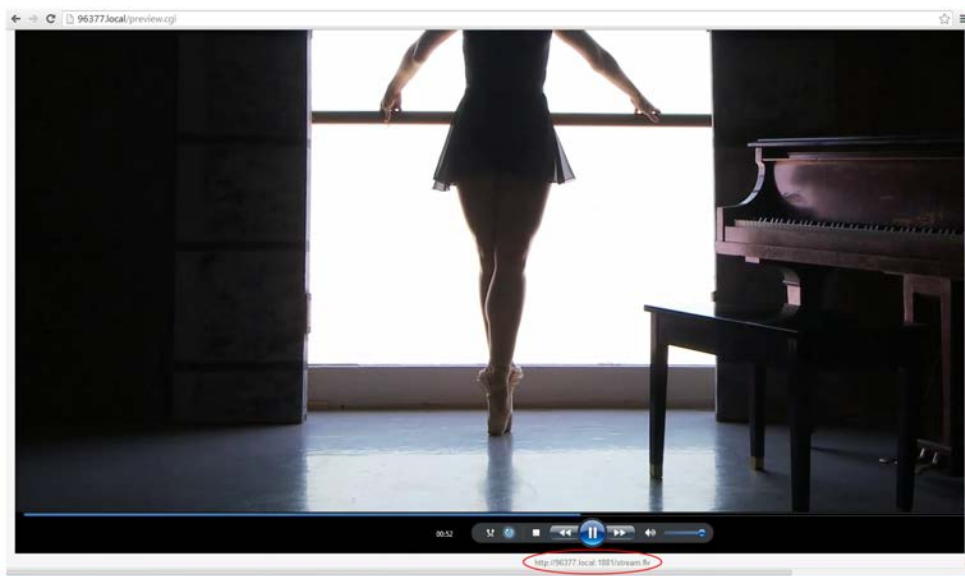
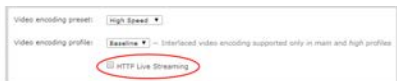
1. Open a web browser.
2. Enter the IP address of the broadcast stream, refer to the example below. To locate the IP address for the broadcast, refer to [Send stream URLs to viewers](#).

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>`

3. Enter the user name and password at the prompt:

User Name: viewer
Password: (enter the viewer password)

4. Press Enter. The stream is played in the browser window.

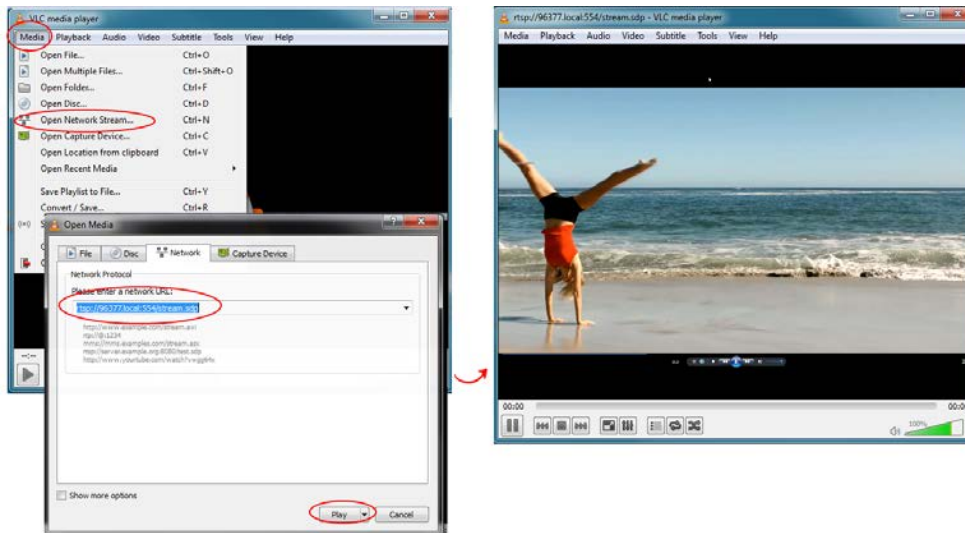


Viewing with a media player (RTSP)

If a viewer password is configured, provide participants with the password to log in, along with the IP address or the URL to be copied to the media player. For example purposes the following procedure describes the steps using a VLC media player.

1. Launch a media player.
2. Click the **Media** tab, a drop-down menu opens.
3. Choose Open Network Stream; a dialog box opens.
4. Enter the stream URL (using either the IP address or the network discovery serial number method).

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



5. Press Play; the stream is played in the media player window.

Disable (and enable) streams for viewers

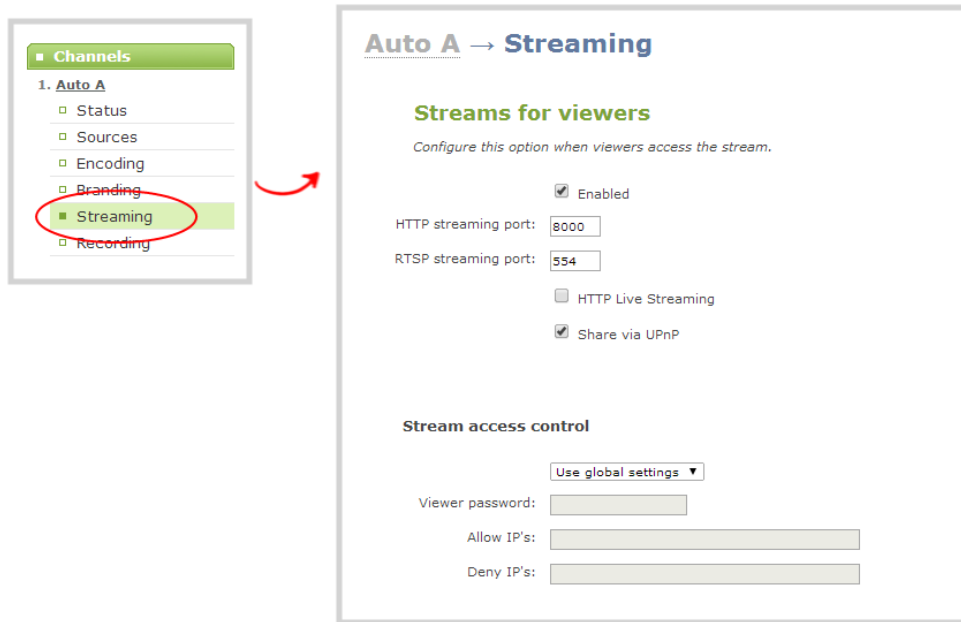
When you create a channel it's available by default for viewing by stream viewers who have the stream URL. You can choose to disable streaming to viewers through the channel's streaming configuration.



Disabling streams for viewers disables all viewer formats including HTTP, RTSP, HLS and UPnP.

To disable (or enable) streams for viewers:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click **Streaming** for the desired channel; the streaming page opens.



3. Uncheck **Enabled** to disable streaming to viewers (or check to enable).
4. Click **Apply** at the bottom of the page.

Restrict access to streams for viewers

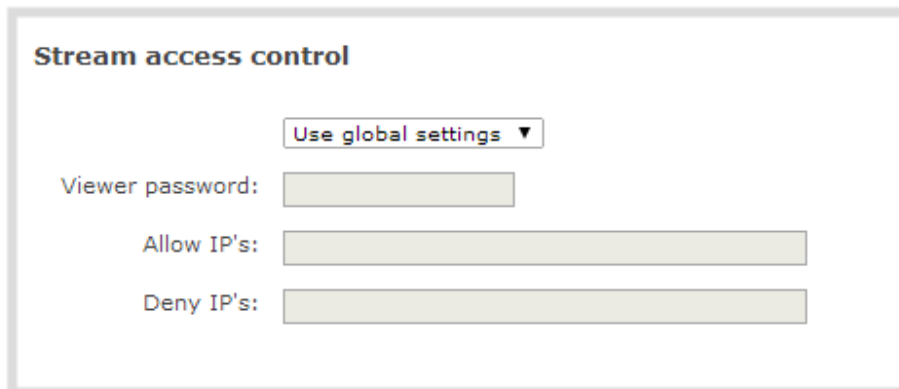
Pearl can restrict access to all viewer streams using global viewer passwords and IP allow/deny lists. See [Set or change user passwords](#) and [Restrict viewers by IP address](#)



If LDAP is configured for viewer authentication, the viewer must pass global authentication 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** for more information on LDAP configuration.

To restrict viewers for a channel:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click **Streaming** for the desired channel; the streaming page opens.
4. Scroll to the **Stream access control** section of the page.



Stream access control

Use global settings ▼

Viewer password:

Allow IP's:

Deny IP's:

5. Select **Use these settings** from the drop down list; the configuration fields are enabled.



Global LDAP settings are always enforced. Any local settings are in addition to LDAP sign on.

6. If desired, specify a password for viewers of this channel; the password appears masked as you type 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.

7. If desired, specify allow and deny IPs for viewers of this channel. See [Restrict viewers by IP address](#) for more information about allow and deny lists.
8. Click **Apply** at the bottom of the page.

To return a channel to the default (global) access control settings:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click **Streaming** for the desired channel; the streaming page opens.
4. Scroll to the **Stream access control** section of the page.
5. Select **Use global settings** from the drop down list; the configuration fields are disabled (any changes to the configuration fields are not saved).
6. Click **Apply** at the bottom of the page.

Restrict viewers by IP address

Pearl permits you to restrict which computers can access broadcasts by building a list of allowed and/or 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 below.



IP address restriction is valid for the viewer only and does not affect the web admin interface or the mobile configuration interface.

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 username (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 you're not familiar with creating allow/deny lists, refer to the examples below this procedure for assistance with crafting your lists.

To restrict viewers by IP address:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Access passwords** link in the Configuration menu; the password configuration page opens.
3. Type allowed IP addresses or address ranges in the **Allow IP's** field. Separate addresses with a comma.
4. Type denied IP addresses or address ranges in the **Deny IP's** field. Separate addresses with a comma.
5. Click **Apply**.

To restrict viewers of a specific channel by IP address:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Streaming** link for the desired channel; the streaming configuration page opens.
3. From the **Access Control** drop-down, select **Use these Settings**; local password and Allow/Deny IP lists are enabled.
4. If desired, type a password for the viewer in the **Viewer Password** field.
5. Type allowed IP addresses or address ranges in the **Allow IP's** field. Separate addresses with a comma.
6. Type denied IP addresses or address ranges in the **Deny IP's** field. Separate addresses with a comma.
7. Click **Apply**.

If a user attempts to connect to the stream from a disallowed IP address, access is denied. If connecting by internet browser, the message "IP address rejected." is displayed.

The following table describes the applicable fields.

Table 33 IP Based Restriction Fields

Label	Description/Options
Allow IP's	<p>Enter individual IP Addresses or IP Address ranges, separated by commas. To specify a range, use a hyphen (-). Optional spaces improve readability.</p> <p>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.</p> <p>To allow all (except IP addresses in the deny list, if any), leave the field blank.</p> <p>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.</p>
Deny IP's	<p>Enter individual IP Addresses or IP Address ranges, separated by commas. To specify a range, use a hyphen (-). Optional spaces improve readability.</p> <p>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.</p> <p>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.</p>

IP restriction examples

Allow list with distinct IP addresses

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

For example if your system is accessible on your local area network (LAN) and you want to make sure only the CEO's specific desktop, laptop and tablet computers (with IP Addresses 192.168.1.50, 192.168.1.51, and 192.165.1.75, respectively) can connect to the broadcast, construct the following allow list:

Allow: 192.168.1.50, 192.168.1.51, 192.168.1.75

Allow list with a range of IP addresses

Sometimes you'll want a range of computer IP addresses to connect to your system. This may happen when you have one range of IP addresses assigned to desktop computers (i.e. in the range 192.168.1.1 to 192.168.1.100) and another range assigned to boardroom computers (i.e. the range 192.168.1.200 to

192.168.1.250). If you only want the boardroom computers to connect to broadcasts from the system you can specify the range of boardroom IP addresses rather than needing to type in each individual address. The allow list looks as follows:

```
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.

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.

Allow list with a range of IP addresses, distinct IP addresses and an exception

Building on the previous examples, consider the situation where you want the CEO's computers (192.168.1.50, 192.168.1.51, 192.168.1.75) and all boardroom computers (192.168.1.200-192.168.1.250) to access the broadcast, with the exception of the public boardroom computer (192.168.1.211). Use both allow and deny lists to create the rule as follows:

Allow: 192.168.1.200-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75

Deny: 192.168.1.211

Both lists can have multiple ranges and multiple distinct IP addresses, provided they are separated by commas.

Deny list with a range of IP addresses

Converse to the previous examples, consider the situation where you want every computer on the network to access the broadcast, with the exception of the CEO's desktop, laptop and tablet computers. Additionally, boardroom computers should not be permitted with the exception of the cafeteria computer (IP address 192.168.1.222).

The deny list is an "exception" list for the allow list. So to craft the rule described above we need to allow all the computers in the local subnet, then deny specific sub-ranges including two groups of boardroom computers ensuring the cafeteria computer's IP address is not in the deny list:

Allow: 192.168.1.1-192.168.1.250

Deny: 192.168.1.200-192.168.1.221, 192.168.1.223-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75

Stream to a server

Your Pearl streams to a server when you want to use a CDN or Multicast. .

By default, no server streaming is configured. See [Stream to a CDN](#) and [Stream content using multicast](#) for details on configuring one of these two options.

Publishing Options	Use this option to...
Content Distribution Network	<p>Stream web content to many viewers 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.</p> <p>Using a CDN to stream live content allows you to reach a large geographically diverse audience and because CDNs perform format conversion, the stream is platform independent.</p> <p>You can control when streaming to a CDN is enabled by using the web admin interface or the touch screen. See Start and stop streaming to a CDN.</p> <p>For more information about streaming to a CDN, see Stream to a CDN.</p>
Multicast Streaming	<p>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.</p> <p>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.</p> <p>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 content using multicast</p> <p>This option can be used to stream video and audio to an IP TV or set top box playlist.</p>



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.



Streaming to CDNs and multicast streaming is available only when the H.264 codec is selected.

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. 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: <http://epiphan.tv/cdn-partners.php>. Contact your CDN for a list of supported audio codecs and ensure your Encoding configuration uses one of the supported codecs.

To publish content to a CDN provider ensure you have:

- a path to the mount point or an XML configuration file (provided by the CDN provider);
- verify which transport protocols your CDN supports;
- a current flash player; and
- select the H.264 codec from the channel's Encoding page.

You can control when streaming to a CDN is enabled by using the web admin interface 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: <http://epiphan.tv/cdn-partners.php>.

Use one of the following links to configure your Pearl for publishing to a CDN:

- [To stream content to a CDN using RTSP announce](#)
- [To stream content to a CDN using RTMP push](#)
- [Stream to a CDN using an XML profile](#)
- [Stream to Wowza Streaming Cloud](#)
- [Test using Epiphan TV CDN](#)

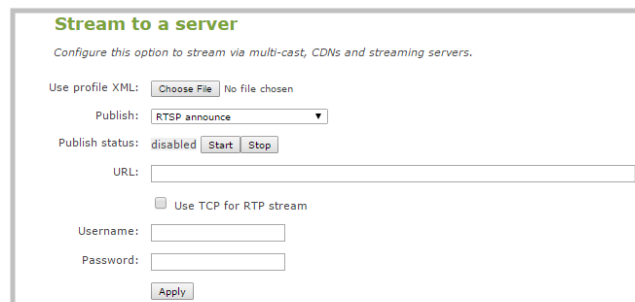
Start and stop streaming to a CDN

Once you have your CDN streaming configured for RTMP, RTSP, Wowza Streaming Cloud, Original Livestream or Epiphan.tv, you can control when streaming is enabled and disabled through the web admin interface or the touch screen.

Start and stop streaming using the web interface

To start (enable) or stop (disable) streaming using the web admin interface:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. From the web interface, click the link for your **Channel**; the menu expands.
3. Click **Streaming**; the channel's Streaming page opens.
4. Scroll to the **Stream to a server** section of the page (your screen may look different depending on the streaming type you have configured).



Stream to a server
Configure this option to stream via multi-cast, CDNs and streaming servers.

Use profile XML: No file chosen

Publish:

Publish status: disabled

URL:

Use TCP for RTP stream

Username:

Password:

5. If Publish is set to disabled, streaming is stopped and cannot be started until you configure a publish type. See the other topics in this section.
6. If streaming is enabled (started), click the **Stop** streaming button (next to the Publish Status label); streaming is disabled.

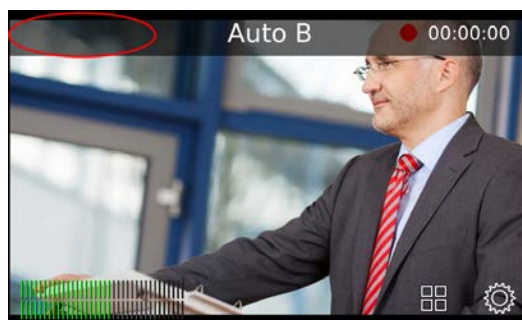
7. If streaming is disabled (stopped), click the **Start** streaming button (next to the Publish Status label); streaming is enabled and a streaming timer appears on the touch screen.

Start and stop streaming using the touch screen

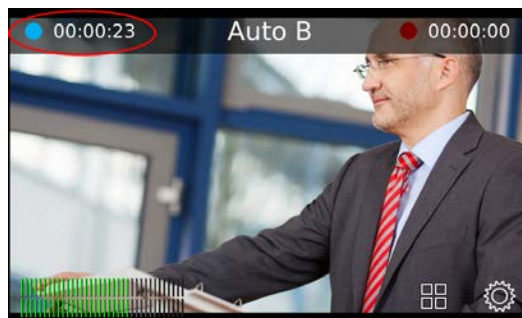
From the individual [Channel monitoring](#) view you can start and stop streaming in a similar way to how you start and stop recording.

To control streaming from the touch screen:

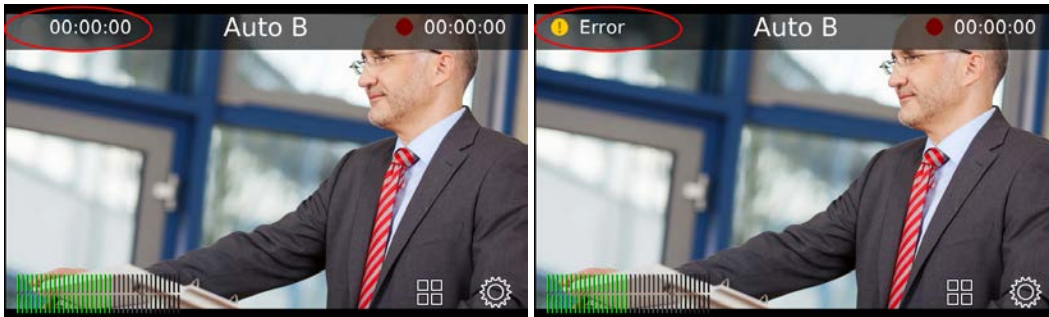
1. Configure your CDN streaming settings.
2. View the individual channel monitoring page for your channel. See [Channel monitoring](#).
3. If streaming is disabled, there is no way to start it - configure the settings and try again.



4. If streaming is already started, you'll see a **flashing blue circle and a timer** (indicating how long streaming has been enabled) at the top left corner of the screen. To stop the stream, touch the **blue circle**.

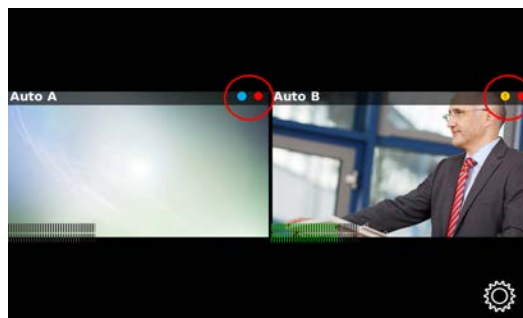


5. If streaming is not started, you'll see a **grey circle and a timer** reading 00:00:00 at the top left corner of the screen. To start the stream, touch the **grey circle** at the left side of the screen; the text changes to **Starting...** then to a **timer** once the server connection is established. (If it's unable to connect to your server, the circle changes to a yellow error icon.)



Note you can also tell whether or not your channel is streaming by looking at it in the Grid view:

- If it has a blue dot in the top right corner, it is currently streaming.
- If it has a yellow dot with an exclamation mark, there is a problem with streaming.



To stream content to a CDN using RTSP announce

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. From the web interface, click a **Channel**; the menu expands.
3. Click **Streaming**; the channel's Streaming page opens.
4. Scroll to the **Stream to a server** section of the page.
5. Click the **Publish** drop-down menu.
6. Choose **using RTSP announce** from the drop-down menu.

Stream to a server
Configure this option to stream via multi-cast, CDNs and streaming servers.

Use profile XML: No file chosen

Publish: RTSP announce ▼

Publish status: disabled

URL:

Use TCP for RTP stream

Username:

Password:

7. If there are no Start and Stop streaming buttons on-screen, click **Apply**; the page refreshes and the Start and Stop streaming buttons appear.
8. If streaming is enabled (started), click the **Stop** streaming button (next to the Publish Status label); streaming is disabled.
9. Enter the ingestion point **url** provided by the CDN or media server.
10. Check the **Use TCP for RTP stream** checkbox. Verify which transport protocols your CDN provider supports.
11. Enter a user name and password.

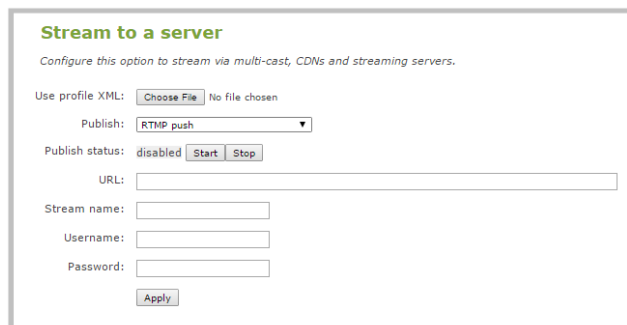


The CDN provider assigns a user name and password to authenticate the publisher. Contact the CDN provider for your log in credentials.

13. Click **Apply**.
14. When ready to begin streaming, click **Start** or see [Start and stop streaming to a CDN](#) for instructions on starting streaming from the touch screen.

To stream content to a CDN using RTMP push

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. From the web interface, click a **Channel**; the menu expands.
3. Click **Streaming**; the channel's Streaming page opens.
4. Click the **Publish** drop-down menu.
5. Choose **using RTMP push** from the drop-down menu.



Stream to a server
Configure this option to stream via multi-cast, CDNs and streaming servers.

Use profile XML: No file chosen

Publish:

Publish status: disabled

URL:

Stream name:

Username:

Password:

6. If there are no Start and Stop streaming buttons on-screen, click **Apply**; the page refreshes and the Start and Stop streaming buttons appear.
7. If streaming is enabled (started), click the **Stop** streaming button (next to the Publish Status label); streaming is disabled.

8. Enter the ingest point **URL** provided by the media server or CDN.
9. In the **Stream name** field, enter the stream name you configured with the CDN.
10. Enter the CDN user name and password.

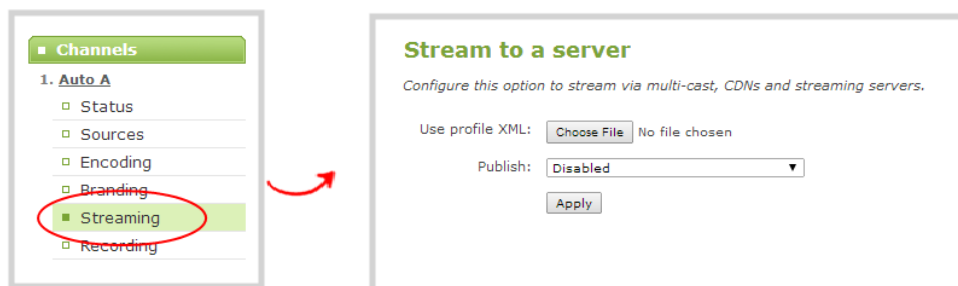


The CDN provider assigns a user name and password to authenticate the publisher. Contact the CDN provider for your log in credentials.

11. Click **Apply**.
12. When ready to begin streaming, click **Start** or see [Start and stop streaming to a CDN](#) for instructions on starting streaming from the touch screen.

Stream to a CDN using an XML profile

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Streaming**; the channel's Streaming page opens.



3. Click the **Choose File** button next to **use profile XML**; a file browser window opens.
4. Select the XML profile supplied by your CDN and click **OK**; the configuration is read from the XML file and applied.

Stream to a server

Configure this option to stream via multi-cast, CDNs and streaming servers.

Use profile XML: epiphan.xml

Publish:

Host:

Port:

Mount point:

Username:

Password:

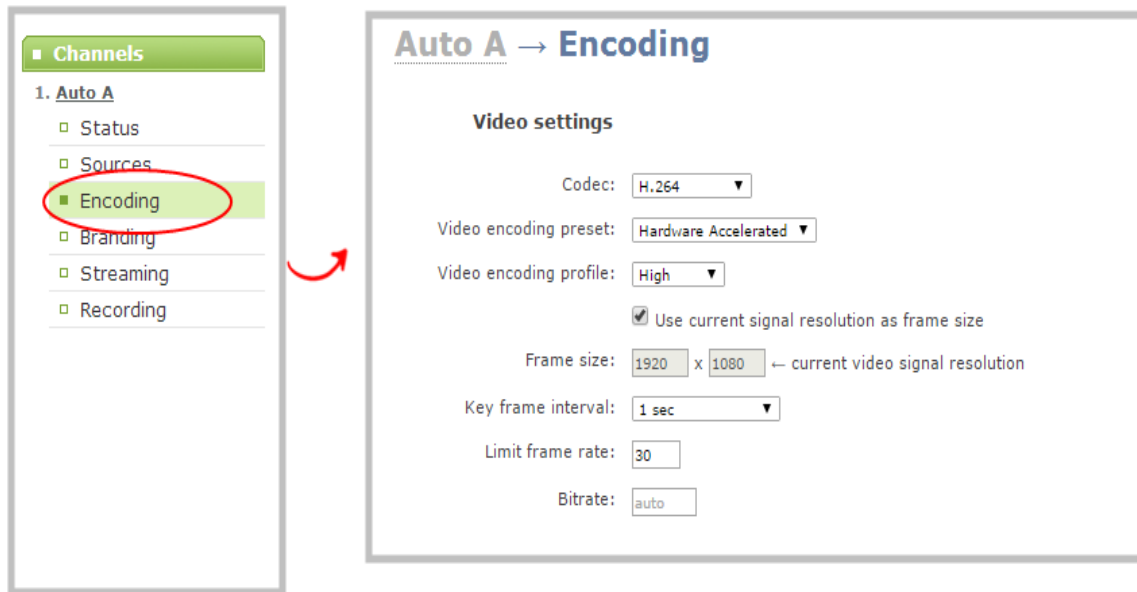
3. Click **Apply**.
4. To control streaming, click **Stop** and **Start** or see [Start and stop streaming to a CDN](#) for instructions on starting streaming from the touch screen.

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 interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Encoding**; the channel's Encoding page opens.

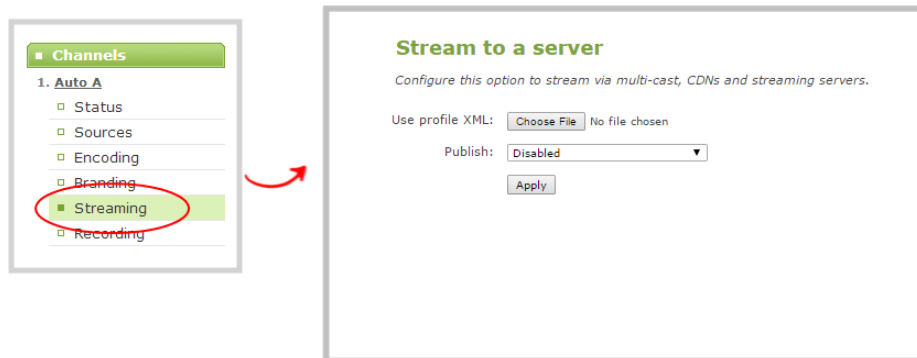


5. Configure Encoding settings accordingly, ensuring the **Codec** selected is H.264.

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

6. Click **Apply**.

7. Under the selected channel, click **Streaming**; the channel's Streaming page opens.



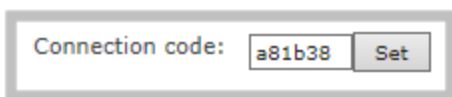
8. Click the **Publish** drop-down menu.

9. Select **to Wowza Cloud** from the drop-down list.

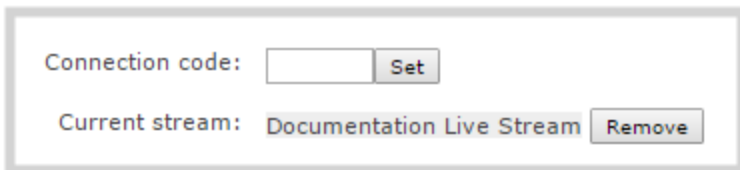
10. Click **Apply**; the page refreshes and the Wowza configuration fields appear.




- 11. Streaming (publish status) must be stopped before proceeding. If streaming is enabled (started), click the **Stop** streaming button (next top the Publish Status label); streaming is disabled.
- 12. Enter the connection code obtained from the Wowza Streaming Cloud set-up into the **Connection code** field.



- 13. Click **Set** to pair the channel on Epiphan's encoder with the live stream on Wowza Cloud; an icon appears to show you the connection is validating. Once validated, the stream name you configured in Wowza Cloud appears.



- 14. When ready to begin streaming, there are two steps to take.
 - a. Click the **Start** Transcoder button. The state changes from **stopped** to **starting**, then to **started**. If you log into your stream on Wowza Cloud you'll see the stream is started, but there is no video detected. (You can also start the transcoder through the Wowza Cloud interface, by clicking Start Stream.)

 This action commences your session charges with Wowza Cloud.

Use profile XML: No file chosen

Publish: ▼

Publish status: disabled

Your Wowza settings will affect this channel's encoding settings. It is recommended you use this channel only for streaming to Wowza. To record or locally stream, create a duplicate channel.

Connection code:

Current stream: Documentation Live Stream

Transcoder state: stopped

- b. To start sending video to the Wowza Cloud, click the **Start** Publish status button or see [Start and stop streaming to a CDN](#) for instructions on starting streaming from the touch screen.

Use profile XML: No file chosen

Publish: ▼

Publish status: disabled

Your Wowza settings will affect this channel's encoding settings. It is recommended you use this channel only for streaming to Wowza. To record or locally stream, create a duplicate channel.

Connection code:

Current stream: Documentation Live Stream

Transcoder state: stopped

- 15. When the connection to Wowza Cloud has been established, the stream name appears on the channel's **Status** page.

Connections			
Stream name	Client IP	Bitrate	Bytes transmitted
Publish	Wowza Streaming Cloud: Documentation Live Stream	6701 kbps	76128 KBytes



After clicking either Transcoder or Publish **Start** buttons, there can be a short delay before the stream is established.

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 the Wowza Cloud stream is stopped in one of these two ways.



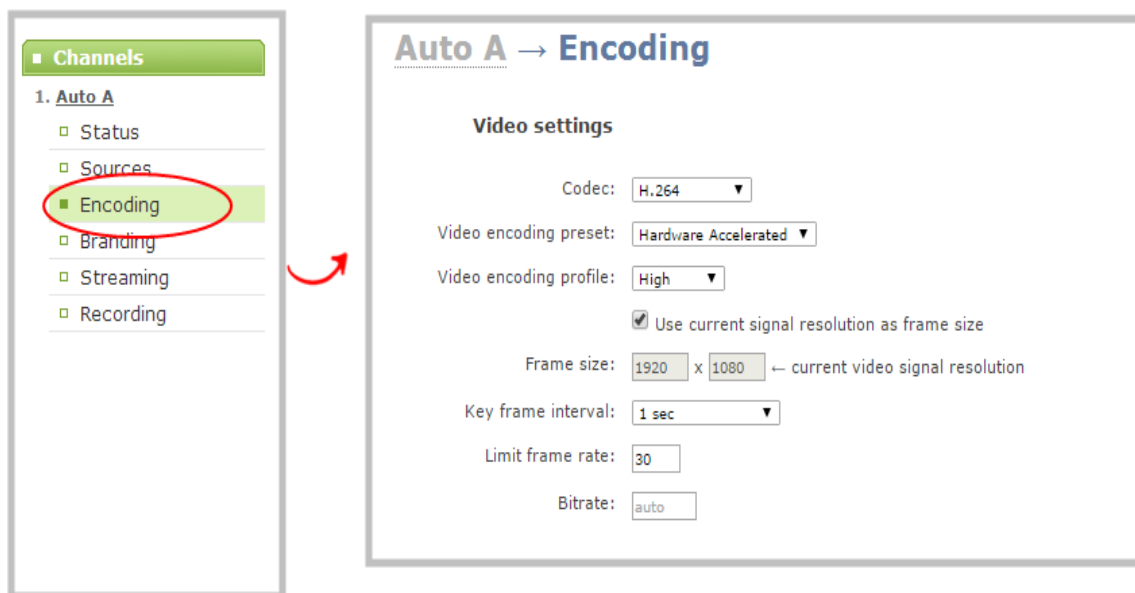
Stopping the stream publish through the touch screen or **Stop** Publish button does not stop the charges applied by Wowza.

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 configure streaming on your Pearl:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Encoding**; the channel's Encoding page opens.

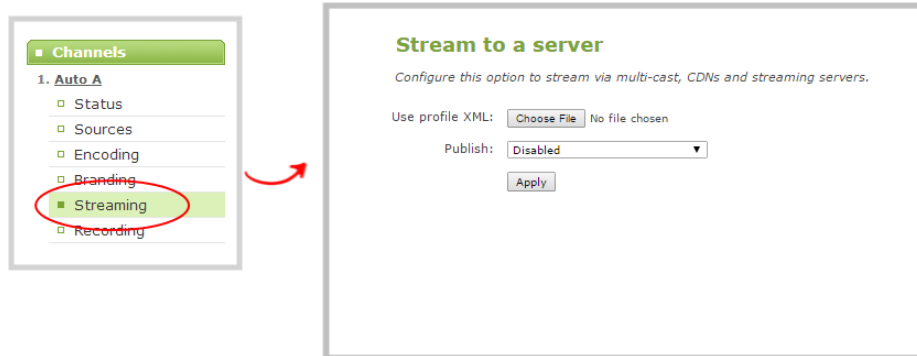


5. Configure Encoding settings accordingly, ensuring the **Codec** selected is H.264.



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

6. Click **Apply**.
7. Under the selected channel, click **Streaming**; the channel's Streaming page opens.




8. Click the **Publish** drop-down menu.
9. Select **Original Livestream** from the drop-down list.



10. If there are no Start and Stop streaming buttons on-screen, click **Apply**; the page refreshes and the Start and Stop streaming buttons appear.
11. If streaming is enabled (started), click the **Stop** streaming button (next to the Publish Status label); streaming is disabled.
12. Enter the channel name in the **Short channel name** field.
13. Enter your Original Livestream **Username** and **Password** in the next two fields.
14. Click **Apply**.
15. When ready to begin streaming, click **Start** or see [Start and stop streaming to a CDN](#) for instructions on starting streaming from the touch screen. When the connection to Original Livestream has been established, the stream name appears on the channel's **Status** page, similar to this example from Wowza Streaming Cloud.

Connections


Stream name	Client IP	Bitrate	Bytes transmitted
Publish	Wowza Streaming Cloud: Documentation Live Stream	6701 kbps	76128 KBytes

 After clicking **Apply**, there may be a short 2-3 minute delay before the live stream is displayed.

Test using Epiphany TV CDN

Epiphany.tv is a service provided by Epiphany to help our customers to experiment with content distribution networks, bandwidth, performance limits and viewer limits are applied. To upgrade to a full service, select one of Epiphany's preferred CDN providers at <http://epiphany.tv/cdn-partners.php>.

Stream to Epiphany TV

 To hear audio content from Epiphany TV ensure audio is set to MP3 in Encoding configuration.

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Streaming**; the channel's Streaming page opens.
5. Scroll to the **Stream to a server** section of the page.
6. Click the **Publish** drop-down menu.
7. Choose **to <serial>. Epiphany.tv**. Where <serial> is the serial number of the system.

Stream to a server


Configure this option to stream via multi-cast, CDNs and streaming servers.

Use profile XML: No file chosen

Publish:

Stream from this device will be available on [6bfe1776_channel7.epiphany.tv](#)

8. Click **Apply**; a connection through the media tunnel is established. The system streams to Epiphan’s portal – epiphan.net.
9. To control streaming, click **Stop** and **Start** or see [Start and stop streaming to a CDN](#) for instructions on starting streaming from the touch screen.



You must set audio format to MP3 when streaming through epiphan.net, see **Configure encoding** .

View content from Epiphan TV

Before viewing content from Epiphan TV ensure you have:

- a current browser;
- a current flash player;
- select the H.264 codec from the channel's Encoding page; and
- set the stream bitrate lower than 500 kbits/s in the channel's Encoding setup.

To view content:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Streaming**; the channel's Streaming page opens.
3. Click the link to view the broadcast.

Click the link to view content streamed to Epiphan TV

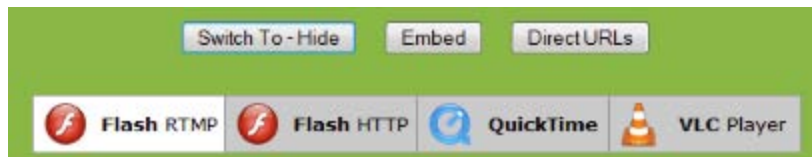


4. A web page opens displaying the broadcast.



Specify a multimedia player to view your Epiphan TV broadcast

1. From the Epiphan TV portal, click **Switch To** on the bottom of the screen; the following options appear.

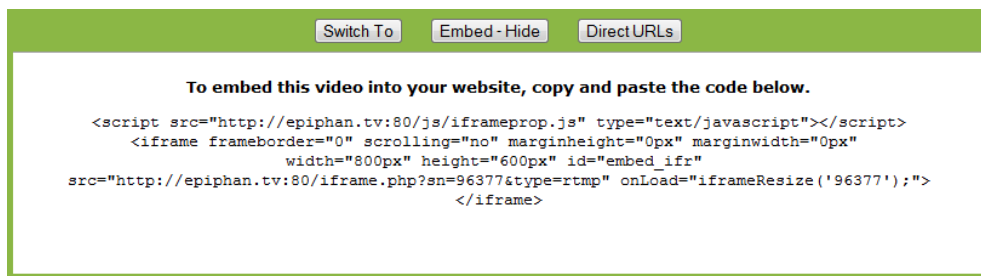


2. Choose a plug-in from the list, the stream is displayed using the selected multimedia player.

Add a link to your website to stream your Epiphan TV broadcast

Follow the steps below to embed code for the broadcast in a web page.

1. Go to the Epiphan TV portal.
2. Click **Embed** on the bottom of the screen; a dialog box opens displaying the code.



3. Highlight and right-click on the code in the dialog box. A drop-down menu appears.
4. Choose **Copy**.

5. Paste the content into the HTML code for your website. A link to your broadcast on Epiphan TV is added to your web page.

Retrieve a list of addresses based on video stream encapsulation

1. Go to the Epiphan TV portal.
2. Click **Direct URLs** on the bottom of the screen; a dialog box opens displaying a list of URLs for different types of streams.



3. Use the copy and paste function to provide viewers with the URL to view the stream.

Stream content using multicast

A multicast stream consists of one stream distributed to many viewers via a multicast-capable network.

Pearl supports multicast streaming content to an IP TV or a set-top box playlist when the stream format is MPEG-TS.

The following procedures outline the steps to distribute your content using multicast streaming:

- 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 interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Streaming**; the channel's Streaming page opens.

5. Click the **Publish** drop-down menu.
6. Choose **using MPEG-TS RTP/UDP push**.
7. 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.

8. Enter the destination port number through which the media will stream.
9. Perform one of the following:
 - a. If you do not want to advertise your stream to a media player over a local network, go to the last step of this procedure; or
 - b. To advertise your stream to a media player over a local network, follow the steps below.
10. Enable the **SAP announcement** checkbox to advertise your stream over a local network. When the checkbox is enabled and a multicast IP address is configured, your stream is displayed in the playlist of local media player.
11. 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.
12. 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 .

13. 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.
14. Click **Apply**.
15. Click the **Info** menu option of the web interface. 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 the MPEG-TS streaming, ensure the following codecs are configured:

- Video – H.264
- Audio – MP3 or AAC, if audio is configured.

To configure MPEG-TS with UDP push:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Streaming**; the channel's Streaming page opens.
5. Click the **Publish** drop-down menu.
6. Choose **using MPEG-TS UDP push**.

Stream to a server

Configure this option to stream via multi-cast, CDNs and streaming servers.

Use profile XML: No file chosen

Publish:

Destination IP:

Destination port:

SAP announcement

SAP announcement IP:

Channel number:

Group name:

7. 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.

8. Enter the destination port number through which the media will stream.
9. Perform one of the following:
 - a. If you do not want to advertise your stream to a media player over a local network, go to the last step of this procedure; or
 - b. To advertise your stream to a media player over a local network, follow the steps below.
10. Enable the **SAP announcement** checkbox to advertise your stream over a local network. When the checkbox is enabled and a multicast IP address is configured, your stream is displayed in the playlist of local media players.
11. 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.
12. 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 .

13. 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.
14. 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 interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Streaming**; the channel's Streaming page opens.

3. Click the **Publish** drop-down menu.
4. Choose **using RTP/UDP push**.

Stream to a server

Configure this option to stream via multi-cast, CDNs and streaming servers.

Use profile XML: No file chosen

Publish:

Destination IP:

Audio port:

Video port:

5. Enter the destination multicast IP address.
6. Enter the port number through which the audio will stream.
7. Enter the 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.

8. Click **Apply**; an SDP file is generated and available from the channel's status **Status** page.
9. Click the SDP file to download it. If asked, specify a name and location for the SDP file.
10. Share the file with viewers.

Stream to a media player

Your Pearl 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 can be discovered and can stream to software and hardware media players, set-top-boxes and Smart TVs with ease.
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 content using multicast

A multicast stream consists of one stream distributed to many viewers via a multicast-capable network.

Pearl supports multicast streaming content to an IP TV or a set-top box playlist when the stream format is MPEG-TS.

The following procedures outline the steps to distribute your content using multicast streaming:

- 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 interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Streaming**; the channel's Streaming page opens.
5. Click the **Publish** drop-down menu.
6. Choose **using MPEG-TS RTP/UDP push**.
7. 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.

8. Enter the destination port number through which the media will stream.
9. Perform one of the following:
 - a. If you do not want to advertise your stream to a media player over a local network, go to the last step of this procedure; or
 - b. To advertise your stream to a media player over a local network, follow the steps below.
10. Enable the **SAP announcement** checkbox to advertise your stream over a local network. When the checkbox is enabled and a multicast IP address is configured, your stream is displayed in the playlist of local media player.
11. 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.
12. 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 .

13. 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.
14. Click **Apply**.
15. Click the **Info** menu option of the web interface. 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 \(SAP\)](#).

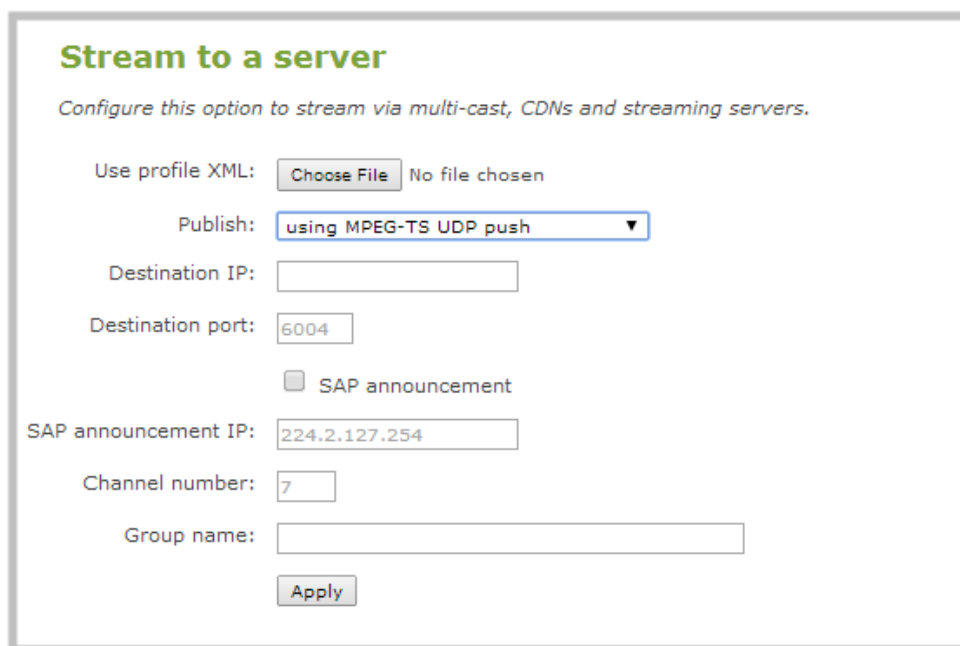
MPEG-TS streams using UDP push

Before configuring your channel for the MPEG-TS streaming, ensure the following codecs are configured:

- Video – H.264
- Audio – MP3 or AAC, if audio is configured.

To configure MPEG-TS with UDP push:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click a **Channel**; the menu expands.
4. Click **Streaming**; the channel's Streaming page opens.
5. Click the **Publish** drop-down menu.
6. Choose **using MPEG-TS UDP push**.



Stream to a server
Configure this option to stream via multi-cast, CDNs and streaming servers.

Use profile XML: No file chosen

Publish:

Destination IP:

Destination port:

SAP announcement

SAP announcement IP:

Channel number:

Group name:

7. 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.

8. Enter the destination port number through which the media will stream.
9. Perform one of the following:
 - a. If you do not want to advertise your stream to a media player over a local network, go to the last step of this procedure; or
 - b. To advertise your stream to a media player over a local network, follow the steps below.
10. Enable the **SAP announcement** checkbox to advertise your stream over a local network. When the checkbox is enabled and a multicast IP address is configured, your stream is displayed in the playlist of local media players.
11. 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.
12. 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 .

13. 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.
14. 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 interface as **admin**. See [Connect to the admin interface](#).

3. From the web interface, click a **Channel**; the menu expands.
4. Click **Streaming**; the channel's Streaming page opens.
3. Click the **Publish** drop-down menu.
4. Choose **using RTP/UDP push**.

Stream to a server

Configure this option to stream via multi-cast, CDNs and streaming servers.

Use profile XML: No file chosen

Publish:

Destination IP:

Audio port:

Video port:

5. Enter the destination multicast IP address.
6. Enter the port number through which the audio will stream.
7. Enter the 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.

8. Click **Apply**; an SDP file is generated and available from the channel's status **Status** page.
9. Click the SDP file to download it. If asked, specify a name and location for the SDP file.
10. Share the file with 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 content 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 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.

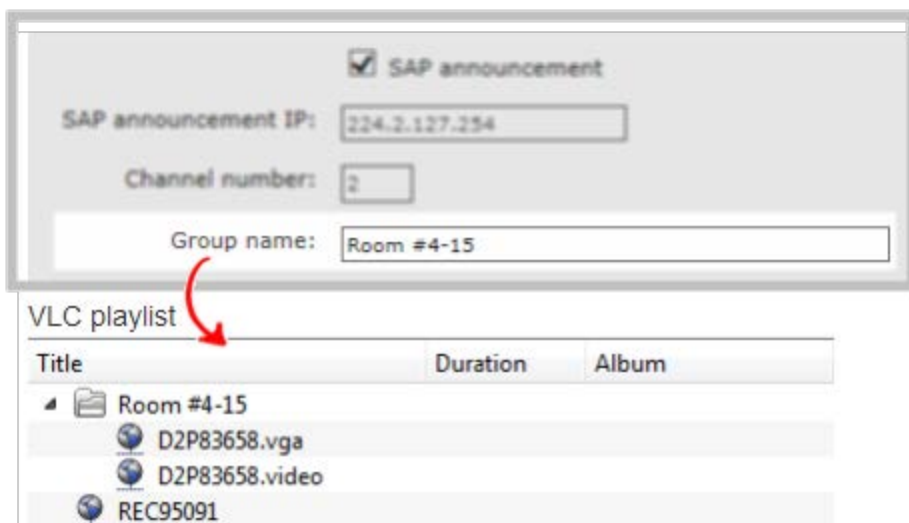
1. Ensure the stream has SAP announcement enabled, otherwise it is not advertised in the media player's playlist.
2. Ensure the SAP announcement IP is a multicast IP address.



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. The following steps are based on a VLC media player and may be different for other media players.
5. Click **View** from the menu; a drop-down menu opens.
6. Select **Playlist**. A Playlist window opens. The right-hand panel indicates the playlist is empty.
7. 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.

In the example below, two streams D2P83658.vga and D2P83658.video are organized in a folder by their group name.



- Click on a live stream; the stream plays in the media player window.

Stream content using UPnP

Using the Universal Plug and Play (UPnP) networking protocol, your Pearl 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 the default behavior prevents UPnP access to live streams and recorded files.

This section covers the following topics:

- Enable UPnP
- Disable UPnP
- Viewing with UPnP
- Play directly to a media player
- Auto-restart playback to a UPnP device
- Change UPnP device name



Some players will not be able to access the stream or saved recordings if a viewer password is set. If needed, see **User administration** to clear the viewer password.

The topics in this chapter include how to enable and disable UPnP and how to control media players from Pearl. To choose recordings or live streams from your media player, see [Play directly to a media player](#).

Enable UPnP

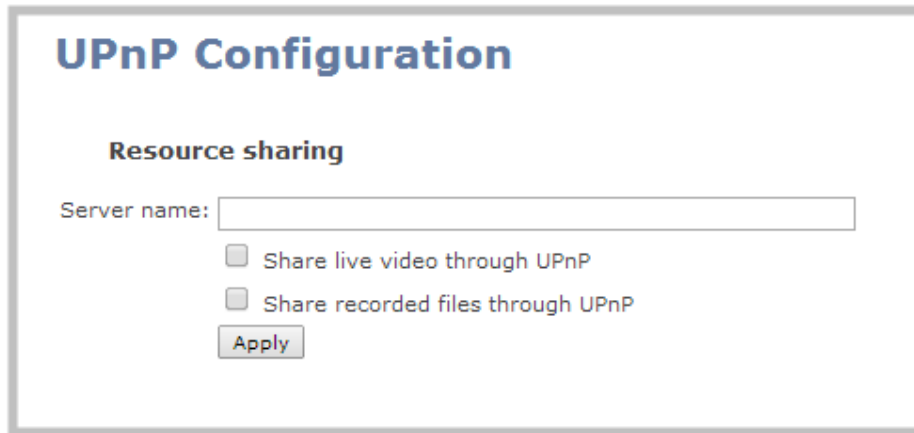
Enable UPnP to allow digital media players on the network to browse for media or live streams from your system. There are two steps required to enable UPnP, enabling UPnP for the system (including setting a share name) and enabling UPnP per channel or recorder. By default, UPnP is disabled at the system level and for each channel.



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.

To enable UPnP:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. Click the **UPnP** link in the Configuration section; the UPnP configuration page opens.



UPnP Configuration

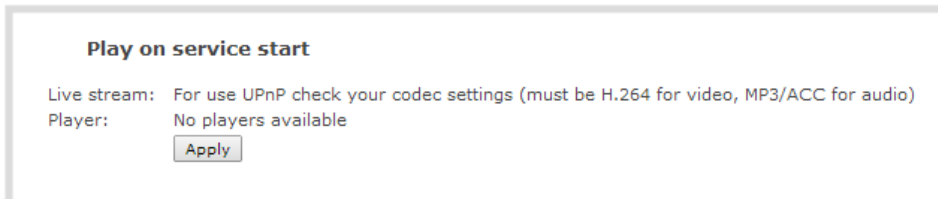
Resource sharing

Server name:

Share live video through UPnP

Share recorded files through UPnP

4. Enter a name in the **Server name** field. If no name is provided the server name will be the system's serial number.
5. Select whether you want to share live video and recorded files.
6. Click **Apply**.
7. 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.

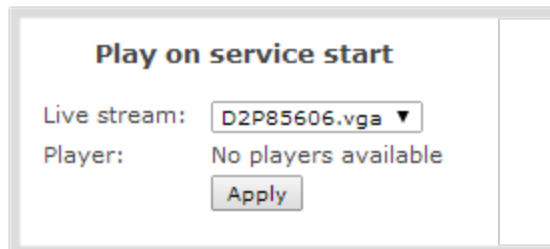


Play on service start

Live stream: For use UPnP check your codec settings (must be H.264 for video, MP3/ACC for audio)

Player: No players available

8. Otherwise, the Play on service start section shows a drop-down list of what can be streamed.



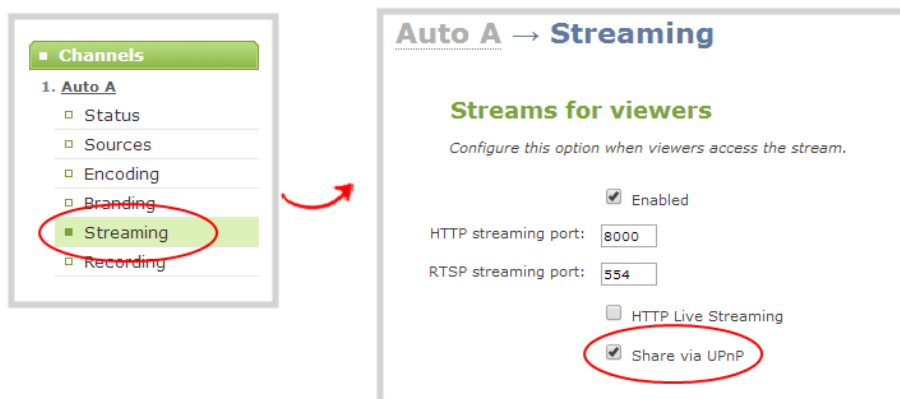
Play on service start

Live stream:

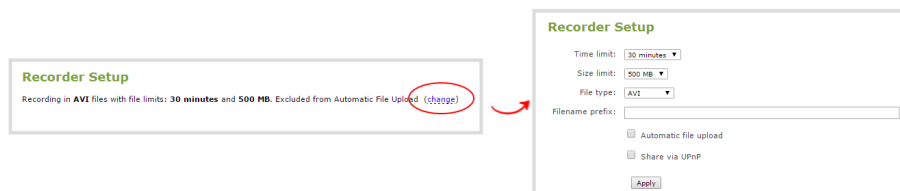
Player: No players available

Enable UPnP sharing for the channels or recorders you want to share:

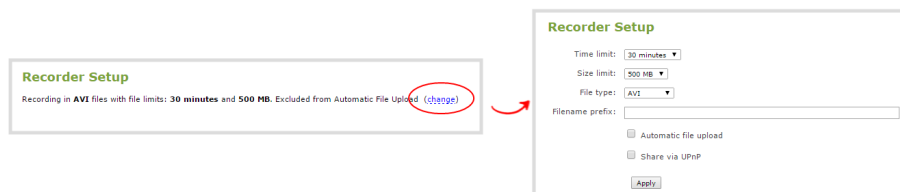
1. For channels (live streaming):
 - a. Click the **Streaming** link for the desired channel; the Streaming page opens.



- a. Click the **Share via UPnP** check box (if not checked).
 - b. Click **Apply**
2. For channels (recorded files):
 - a. Click **Recording** for the desired channel; the channel's recording page opens.
 - b. Click the word **change** next to the list of what is being recorded; the recording options expand.



- c. Click the **Share via UPnP** check box (if not checked).
 - d. Click **Apply**.
3. For recorders:
 - a. Click the link for the recorder from the Recorders menu; the recorder's configuration page opens.
 - b. Click the word **change** next to the list of what is being recorded; the recording options expand.



- c. Click the **Share via UPnP** check box (if not checked).
- d. Click **Apply**.

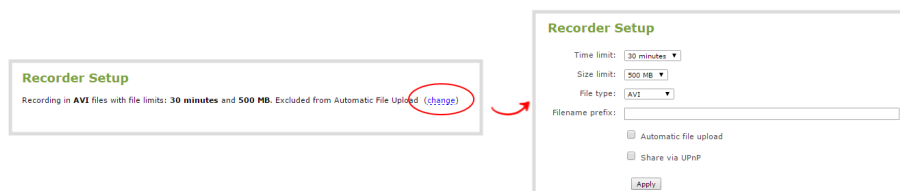
You can now browse for your server from your digital media player.

Disable UPnP

By default, UPnP sharing is disabled for the device, and for each channel 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 the **Streaming** link for the desired channel; the Streaming page opens.
 - b. Deselect the **Share via UPnP** check box (if checked).
 - c. Click **Apply**
2. For recorders:
 - a. Click the link for the recorder from the Recorders menu.
 - b. Click the word **change** next to the list of what is being recorded; the recording options expand.



- a. Deselect the **Share via UPnP** check box (if not checked).
- b. Click **Apply**.

To disable UPnP globally (for the whole system):

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. Click the **UPnP** link in the Configuration section; the UPnP configuration page opens.
4. Deselect **Share live video through UPnP** to stop sharing live video.
5. Deselect **Share recorded files through UPnP** to stop sharing recorded files.
6. Click **Apply**; UPnP sharing is disabled.

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.

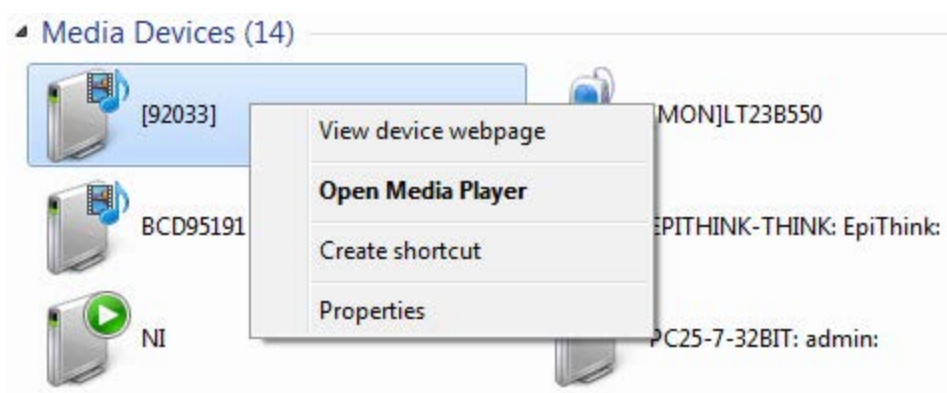


For security reasons the default behavior prevents UPnP access to live streams and recorded files. To enable UPnP, see **Enable UPnP**



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 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:



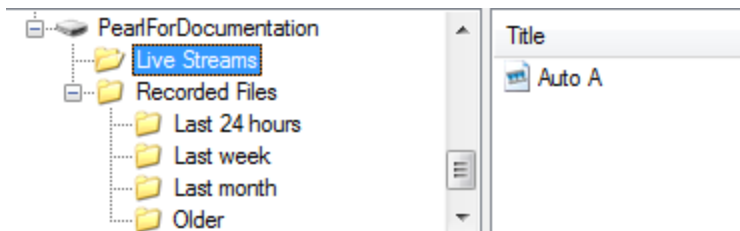
Live streams

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. See [Stream content using UPnP](#) and [Play directly to a media player](#).

Play directly to a media player

If your digital media player is UPnP enabled, Pearl 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. Having a viewer password could prevent the ability to use UPnP.

To play directly to a media player:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Ensure **Share recorded files through UPnP** is enabled on your Pearl and for the channel or recorder you wish to share. (See [Enable UPnP](#).)
3. Go to the recorded files list for the desired 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(s) 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 restarts.

To configure auto-restart of a stream to a media player:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. Click the **UPnP** link in the Configuration section; the UPnP configuration page opens.
4. Scroll to the Play on service start section.
5. Select a stream to use from the **Live stream** drop-down list.

6. Select a digital media player from the **Player** drop-down list. (Digital media players on your network that support UPnP playback will automatically appear in the drop-down list.)
7. 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. 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 interface as **admin**. See [Connect to the admin interface](#).
3. Click the **UPnP** link in the Configuration section; 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**; the name changes.

Samples of stream settings

When choosing your stream settings it is important to consider the stream content. When streaming fast moving video it's best to choose a higher bitrate and frame rate versus streaming a slide presentation where you can save on bandwidth and system processing by lower the bitrate and frame rate. Stream setup is a matter of balancing quality and system resource usage.

To help you to achieve this balance the following tables list the recommended settings when streaming video and slide content from a PC, Mac or tablet.

Streaming video content

The table below provides suggested settings to maximize your video quality while minimizing system resource usage when streaming video content from a PC, Mac or tablet.

Setting	PC and Mac	Tablet
Codec	H.264	Motion JPEG
Video encoding preset	Hardware accelerated	
Video encoding profile	Main	
Enhanced compatibility mode (h.264 slicing for RTP)	Disable for PC Enable for Mac	
Key frame interval	2 sec	
Limit frame rate	30	30
Bitrate	2000 Kbits for HD 3000 Kbits for Full HD 3000 kbits for ~ HD; 4000 kbits for ~ Full HD (Mac)	auto
Rate control mode	Balanced	
Audio format	PCM 22 KHz	

Streaming slide content

The table below provides suggested settings to maximize your stream quality while minimizing system resource usage when streaming slide content from a PC, Mac or tablet.

Setting	PC and Mac	Tablet
Codec	H.264	Motion JPEG
Video encoding preset	High Quality	
Video encoding profile	High	
Enhanced compatibility mode (h.264 slicing for RTP)	Disable for PC Enable for Mac	
Key frame interval	2 sec	
Limit frame rate	15	15
Bitrate		auto
Rate control mode	Balanced	
Audio format	PCM 44 KHz	

PART 4: Record

Your Pearl encodes the video and audio it captures. Not only can you stream this content, but you can also simultaneously record it. In fact, if you're streaming a picture in picture layout or low quality streams, you may even want to create separate channels to also record each input at full frame size and with a high bitrate so you have the best possible digital media for future re-use or post-processing.

If you choose to record your channels, Pearl stores the recorded files on the system's amply-sized hard drive and provides you a variety of automatic or manual mechanisms to download the files.

This section discusses the following topics related to recording:

- [What is a recording?](#)
- [Recorders](#)
- [Recorded files](#)
- [File and recording transfer](#)
- [Local FTP server](#)

What is a recording?

Your Pearl can record the output from each channel. (See [Recorders](#) for information on creating multi-track recorders using multiple channels.) Recordings are very robust and crafted so that even in the case of accidental system shutdown, recording files are closed off and playable.

You can choose to record simultaneously while streaming, or record without streaming.

This section describes the following topics for creating and configuring recordings via the web interface.

- [Recording basics](#)
- [Record a channel via the web interface](#)
- [Record a channel via the touch screen](#)
- [Record with a recorder](#)
- [Configure recording file size and type](#)
- [Restart recording](#)
- [Control recording with a mouse](#)
- [Control recording with the big red button](#)
- [Save directly to USB drive](#)

Recording control is easily performed through the Web admin interface, but can also be set up for third party tools using our APIs. See [Control with HTTP commands](#) and [Control with RS-232 / serial port](#) for information on controlling recordings with third party tools.

See [Recorded files](#) to learn how to download the recorded files.



Recording can also be controlled via the tablet interface. See **[Control recording via the tablet interface](#)**.

Recording basics

While recording a channel or recorder, a new file is created each time the maximum time or size limit is met. Additionally, 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.

Physically removing the source (e.g. unplugging it) or otherwise interrupting the signal to the source does not affect recording, and the recording will include the configured No Signal image. When recording auto channels, a new recording is made when the input changes from one to another due to signal loss.



You can choose to create AVI, MP4, MOV or MPEG-TS recordings. See [Configure recording file size and type](#) to learn how to change the recorded file type. (Note there are two supported MP4 types, regular MP4 which is a progressive file format, and MP4-fragmented which is a more modern, fragmented format that isn't supported by all video players or editors.)

The MOV file type created by Pearl requires a relatively newer player for playback. Epiphan has tested with the following players.

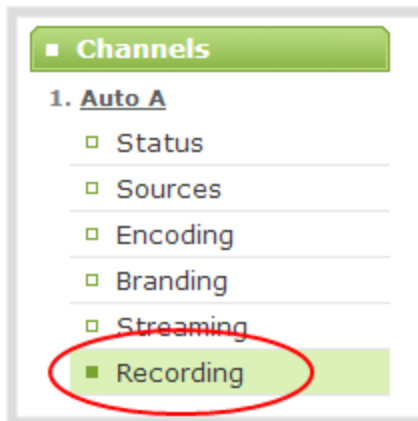
Operating System	Tested Players
Mac OS	<ul style="list-style-type: none"> • QuickTime 10.3 (for 1080p streams) • QuickTime 10.3 (for streams less than 1080p) • VLC 1.0.0+ (for all streams)
Windows	<ul style="list-style-type: none"> • QuickTime 7.6.6+ • VLC 2.1.5+ • Windows Media player 12+ (except MOV files)
Linux	<ul style="list-style-type: none"> • MPlayer • VLC 2.0.8+
Android	<ul style="list-style-type: none"> • DICE 2.0.21 • VLC 0.9.9+ (works only with MOV files that have no audio)
HTML 5 Browsers (Windows)	<ul style="list-style-type: none"> • Google Chrome 37+ (works with MOV and MP4 files using H.264 codec)

Record a channel via the web interface

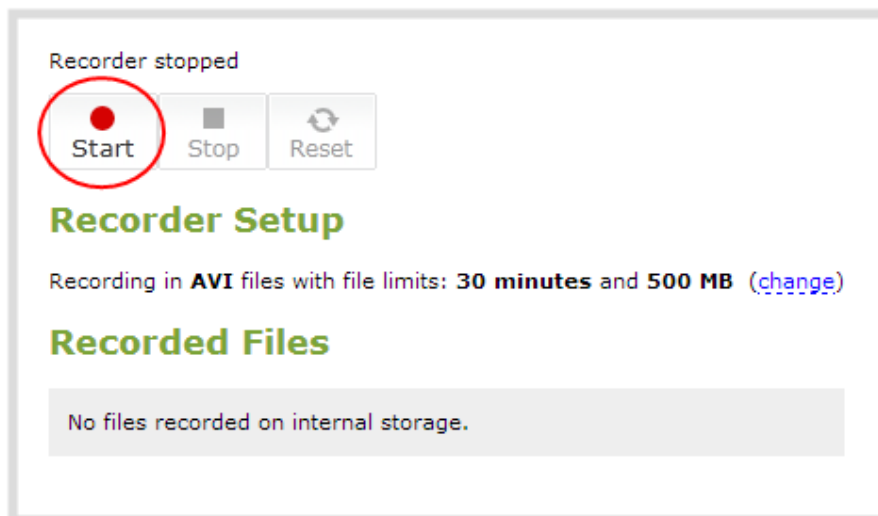
Each channel has a configuration page that allows you to start, stop and configure recordings.

To start and stop channel recording:


1. Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).
2. Click the name of the desired channel; the channel menu expands.



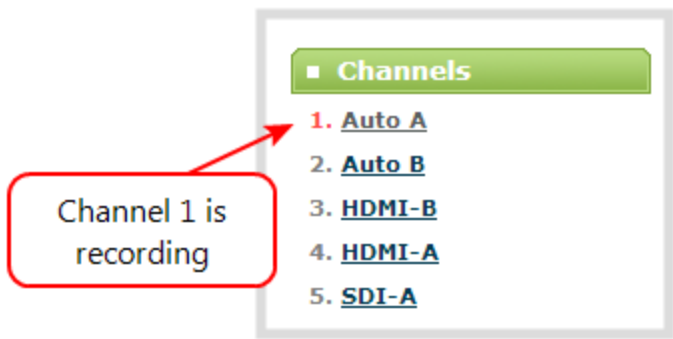
- 3. Click the **Recording** link for the channel; the Recording page appears.
- 4. To start recording:



- a. Click the **Start** button; the recording starts and a timer indicates how long it has been recording.

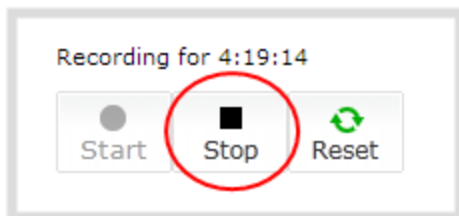
 If the Start button is not active, there are no active sources for this channel or recorder. Check your inputs to ensure signals are working as expected.

- b. You may browse away from the page without affecting the recording. When the page refreshes, the channel number is displayed in red to indicate recording is underway.



c. The system continues to record this channel (and any concurrent recordings) until it is stopped. If the system runs out of storage space, the oldest recorded file is deleted to make room for the new recording. The recording is broken into multiple files as defined by the channel configuration. See [Configure recording file size and type](#).

5. To stop recording:

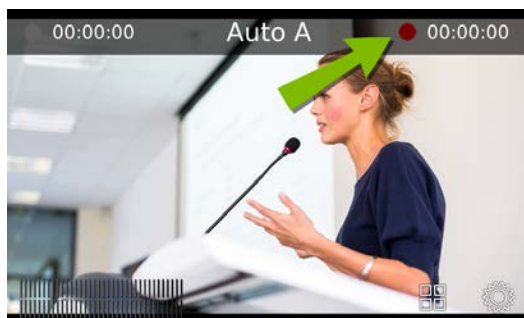



a. Click the **Stop** button on the given channel's Recording page. The channel number changes to black next time the web interface is refreshed (by clicking a link or refreshing the page).

Record a channel via the touch screen

Pearl's touch screen gives you freedom to start and stop recording without needing to log in to the web interface.

Simply scroll to the channel you wish to control and press the start or stop recording button.



 The touch screen may be configured to be always off, to prevent channel preview, or to prevent recording control. If you are unable to follow the instructions below, see the **Configure the touch screen**

To start recording:

1. If necessary, tap the screen once to turn it on or to turn on the screen overlay.
2. If the grid view is showing, tap the channel for which you wish to control recording; the screen displays the channel.
3. If necessary, tap the screen once to display controls on the channel view.
4. Touch the red record button at the top right of the screen; recording starts and a timer is displayed to show the length of the recording.



To stop recording:

1. If necessary, tap the screen once to turn it on.
2. If the grid view is showing, tap the channel for which you wish to control recording; the screen displays the channel.
3. If necessary, tap the screen once to display controls on the channel view.
4. Touch the red record button at the top right of the screen; recording stops and the timer disappears.



Configure recording file size and type

By default, recorders and channels record to AVI files. When the recording reaches 30 minutes in length or a file size of 500 MB (whichever occurs first), the system closes the current recording file and opens a new one. This is done seamlessly with no loss in recorded data.

You may find it useful to have recordings divided this way for ease of download, but you may also want to change the recording limits to be larger or smaller to meet your individual situation.

Additionally you can configure the file type (AVI, MP4, MP4-Fragmented, MOV or MPEG-TS) and the prefix for all recordings (the suffix is the date and time of the recording) and you can exclude a channel or recorder's recordings from automatic upload.

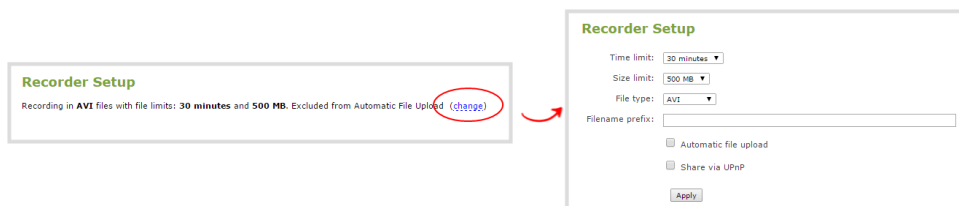


For MP4 recordings, select MP4 for best compatibility with video players and editors. Select MP4-Fragmented for the same file format as releases 3.15.x.


Note: There is no way to tell the difference between the two types of MP4 files once a recording files is saved. Both use the .mp4 extension.

To change the recording configuration:


1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. For a channel recording:
 - a. Click the desired channel; the channel menu expands.
 - b. Click the **Recording** link for the channel; the Recording page opens.
3. For a recorder:
 - a. Click the desired recorder link from the Recorders section; the recorder configuration page opens.
4. Click the **change** link under Recorder Setup; the recorder setup section expands. (The setup page looks slightly different for Recorders, but the options are the same.)



5. Select a time limit for the recording from the **Time limit** drop down.
6. Select a file size limit from the **Size limit** drop down.

 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.

7. Select a file type from the **File type** drop down.
8. If desired, enter a prefix for the recordings. All new recording files for this channel or recorder will be prefixed with the text you enter.

 Tip: It's best to avoid spaces in file names. Use underscores or hyphens to separate words.

9. If desired, click the check box to exclude this channel or recorder from automatic file uploads. (See [File and recording transfer](#) for information on automatic uploads.)
10. Click **Apply**; the changes are saved and the recorder setup displays the new configuration.


Recorder Setup
 Recording in **MOV** files with file limits: **45 minutes** and **100 MB**. Filename prefix is **recording-from-room-a** ([change](#))

The table below describes the options available for recording file configuration.

Table 34 Recording File Configuration Fields

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 six hours.	
Size limit	Specifies the file size a recording can become before it is saved and a new one 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. This MP4 type has the best video player and editor compatibility. (Note that progressive MP4 files are initially recorded as MP4-Fragmented and are converted when the file is closed. If

Label	Description / Options								
	<table border="1"> <tr> <td data-bbox="407 270 721 380"></td> <td data-bbox="721 270 1437 380">power is lost during conversion, the files is reverted to (and remains in) fragmented MP4 format.)</td> </tr> <tr> <td data-bbox="407 380 721 443">MP4-Fragmented</td> <td data-bbox="721 380 1437 443">A newer MP4 format. Fixed 10 second intervals.</td> </tr> <tr> <td data-bbox="407 443 721 548">MPEG-TS</td> <td data-bbox="721 443 1437 548">Choose for UPnP playback. Does not support PCM audio encoding.</td> </tr> <tr> <td data-bbox="407 548 721 653">MOV</td> <td data-bbox="721 548 1437 653">Generally used for playback on Mac OS. Uses a fragmented format with fixed 10 second intervals.</td> </tr> </table>		power is lost during conversion, the files is reverted to (and remains in) fragmented MP4 format.)	MP4-Fragmented	A newer MP4 format. Fixed 10 second intervals.	MPEG-TS	Choose for UPnP playback. Does not support PCM audio encoding.	MOV	Generally used for playback on Mac OS. Uses a fragmented format with fixed 10 second intervals.
	power is lost during conversion, the files is reverted to (and remains in) fragmented MP4 format.)								
MP4-Fragmented	A newer MP4 format. Fixed 10 second intervals.								
MPEG-TS	Choose for UPnP playback. Does not support PCM audio encoding.								
MOV	Generally used for playback on Mac OS. Uses a fragmented format with fixed 10 second intervals.								
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, _ , #, -, [], ().								
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 checkbox, a link appears to let you to fix it. Click the link and click Apply to make the global UPnP change save your recording configuration changes.								

 If you've chosen MP4 as your file type, the file is initially saved as **MP4 Fragmented**, and at the end of the recording is converted to regular **MP4** (also know as MP4 Progressive) format. If the system loses power during recording or before the conversion completes, the file is preserved but remains in MP4 fragmented format. Simply run the file through ffmpeg or another transcoder, preserving both audio and video output to convert to progressive format.

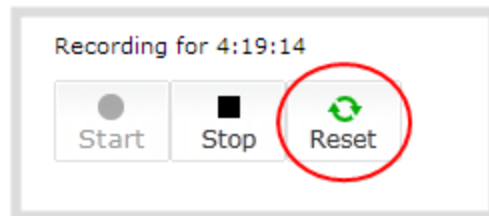
Restart recording

Recording files are automatically saved and new ones opened for writing when they reach the configured time or size limit, when the channel or recorder name is changed, or when changes are made to the stream.

You cannot download files from the system while they are being recorded, so from time to time you may need to close the current recording and restart a new one to facilitate file downloads. The system supports this through the recording reset option, which closes the current recording file and opens a new one without missing any frames.

To close the current recording and start a new file:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. For a channel recording:
 - a. Click the desired channel; the channel menu expands.
 - b. Click the **Recording** link for the channel; the Recording page opens.
3. For a recorder:
 - a. Click the desired recorder link from the Recorders section; the recorder configuration page opens.



4. Click the **Reset** button next to the stop button; the current file is stopped and a new one begins.
5. Refresh the page to see the new recorded files list.

Recorders

Your Pearl can record the output from each channel and, using Recorders, it can also record multiple channels together in a single multi-track file.

Recording multiple channels at once ensures the recordings are started and stopped at the same time, resulting in perfect synchronization. Once the recording is complete, you can automatically use one of the system's file synchronization methods to copy it off the server, or you can use our built-in tool to split the file into individual tracks for post-processing.



You only need to create recorders for multi-track recordings. For single channel recordings, see **Record a channel via the web interface**.

This section describes the following topics for creating and managing multi-channel recorders.

- [Add a recorder](#)
- [Change the channels recorded by a recorder](#)
- [Record with a recorder](#)
- [Rename a recorder](#)
- [Delete a recorder](#)

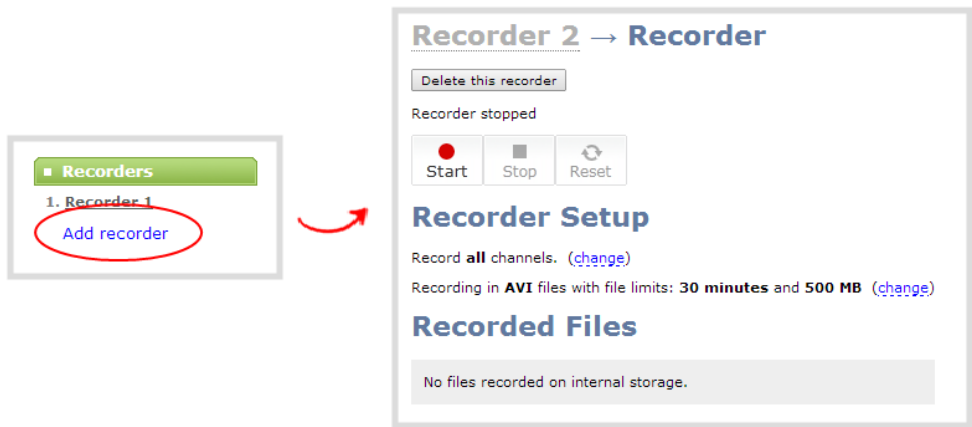
See [What is a recording?](#) to learn how to create recordings and configure recording file sizes.

Add a recorder

Each channel has its own built-in recorder that is accessible from the Recording link. If you want to record several channels simultaneously to a multi-track file, create a new recorder.

To add a new recorder:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Click the **Add recorder** link from the Recorders section; a new recorder is created and the recorder configuration page opens. By default this recorder uses the next available number and records all channels.



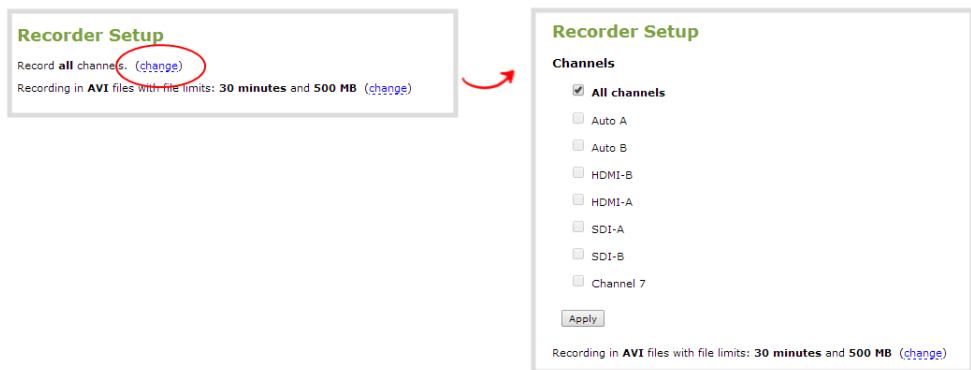
Change the channels recorded by a recorder

By default when you create a new recorder, it records all the channels configured on the system. If new channels are added, they are automatically added to the recorder.


If you wish to record a subset of channels to a single multi-track file, you can edit the channels recorded by a recorder.

To change the channels recorded by a recorder:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the desired recorder link from the Recorders section; the recorder configuration page opens.
3. Click **change** next to the list of what is currently being recorded.



4. If the all channels box is selected, click it to deselect it; the other check boxes are enabled.
5. Click the check boxes for the desired channels.

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

6. Click Apply; the changes are reflected in the recorder configuration page.

Recorder Setup

Record channel(s): **Auto A, HDMI-A**. [\(change\)](#)

Recording in **AVI** files with file limits: **30 minutes** and **500 MB** [\(change\)](#)

Record with a recorder




Recorders are stopped and started via their configuration page. Multiple recorders and channel recordings can occur concurrently.

The number of channels being recorded is displayed below the recording stop/start buttons. To configure the channels being recorded, see [Change the channels recorded by a recorder](#).

To start and stop recorder:

1. Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).
2. Click the name of the desired recorder; the recorder configuration page appears.
3. To start recording:

Recorder stopped

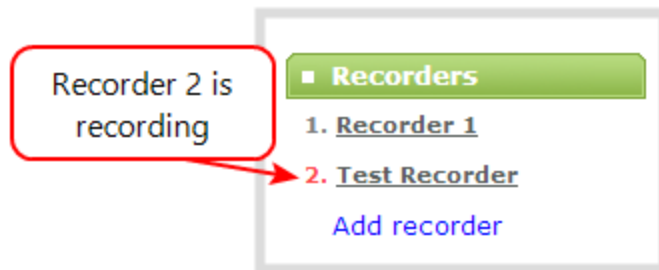
Recorder Setup

Recording in **AVI** files with file limits: **30 minutes** and **500 MB** [\(change\)](#)

Recorded Files

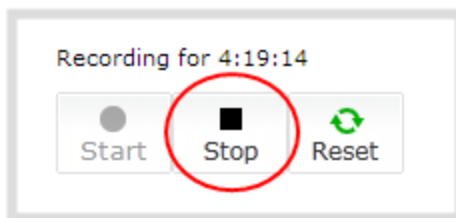
No files recorded on internal storage.

- a. Click the **Start** button; the recording starts and a timer indicates how long it has been recording.
- b. You may browse away from the page without affecting the recording. When the page refreshes, the recorder number is displayed in red to indicate recording is underway.



- c. The system continues to record this recorder (and any concurrent recordings) until it is stopped. If the system runs out of storage space, the oldest recorded file is deleted to make room for the new recording. The recording is broken into multiple files as defined by the recorder configuration. See [Record with a recorder](#).

4. To stop recording:



- a. Click the **Stop** button on the given recorder's configuration page. The recorder number changes to black next time the web interface is refreshed (by clicking a link or refreshing the page).

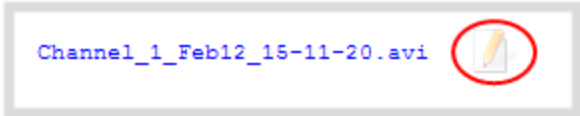
Rename recorded files

Recording files are named based on the filename prefix specified during configuration. If needed, you can rename them to something more descriptive.


You can also change the default naming mechanism. See [Configure recording file size and type](#) for more details about setting filename prefixes.

To rename recordings:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Find the recordings by channel or by recorder. See [View list of recorded files](#).
3. Select the pencil and paper icon next to the filename you wish to change.



4. Type the new file name and press enter when finished.

 The web interface keeps track of the filename extension (i.e. .avi) so you do not need to include it when renaming the file.

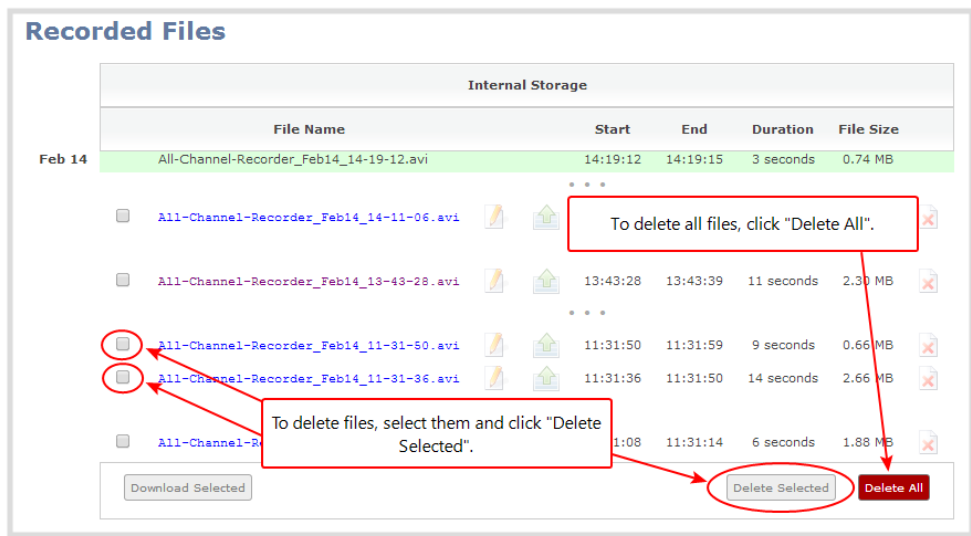
Delete recorded files manually

Recordings can be manually deleted via the web interface. 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.

If you want to delete all the files on the system, follow this procedure for each channel and recorder listed in the web interface.

To delete recordings:

1. Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).
2. Find the recordings by channel or by recorder. See [View list of recorded files](#).



3. To delete an individual file:
 - a. Click the X icon to the right of a file entry to request deletion; a confirmation dialog appears.
 - b. Click OK on the confirmation dialog.

4. To delete multiple files for the current channel or recorder:
 - a. Select the check box next to the recordings you wish to delete from this channel or recorder.
 - b. Click **Delete Selected**; a confirmation dialog appears.
 - c. Click **OK** on the confirmation dialog.



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).

5. To delete all files for the current channel or recorder:
 - a. Click **Delete All**; a confirmation dialog appears.
 - b. Click **OK** on the confirmation dialog.



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).

Recorded files

Recordings you make of channels or with recorders are stored on the system's internal hard drive. Pearl has a finite amount of available hard drive storage space. Though it is enough space to hold a lot of recordings, it will eventually run out of space if recordings are added but never removed. When this happens, the system deletes the oldest recorded files to make room for new recordings.

You can use a variety of methods to automatically transfer files from the system to local network storage. Alternatively you can manually select individual recordings to transfer or delete.

This section discusses the following manual file management topics.

- [View list of recorded files](#)
- [Download recorded files manually](#)
- [Extract tracks from a recording](#)
- [Rename recorded files](#)
- [Delete recorded files manually](#)

For information on automatic file transfers, see [File and recording transfer](#).

View list of recorded files

Recordings for Pearl are stored for each channel and each recorder separately. To view all the recordings stored, follow the procedures below for all channels and all recorders you have configured.

To view the recordings for a channels or recorders:

1. Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).
2. To view files recorded for a channel:
 - a. Select a channel from the Channels section; the channel menu expands.
 - b. Select the **Recording** link for your channel; the Recording page appears.
3. To view files recoded for a recorder:
 - a. Select the recorder from the Recorders section; the recorder page appears.
4. If there are no files:
 - a. A message indicates there are no recorded files (for this channel).



Recorded Files

No files recorded on internal storage.

- 5. Otherwise:
 - a. All files for this channel are listed, 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.

Recorded Files

File currently being recorded.

Internal Storage

	File Name	Start	End	Duration	File Size
Feb 14	All-Channel-Recorder_Feb14_14-19-12.avi	14:19:12	14:19:15	3 seconds	0.74 MB
	...				
	All-Channel-Recorder_Feb14_14-11-06.avi	14:11:06			
	...				
	All-Channel-Recorder_Feb14_13-43-28.avi	13:43:28	13:43:39	11 seconds	2.30 MB
	...				
	All-Channel-Recorder_Feb14_11-31-50.avi	11:31:50	11:31:59	9 seconds	0.66 MB
	All-Channel-Recorder_Feb14_11-31-36.avi	11:31:36	11:31:50	14 seconds	2.66 MB
	...				
	All-Channel-Recorder_Feb14_11-31-08.avi	11:31:08	11:31:14	6 seconds	1.88 MB

Files from the same recording.

Download Selected Delete Selected Delete All

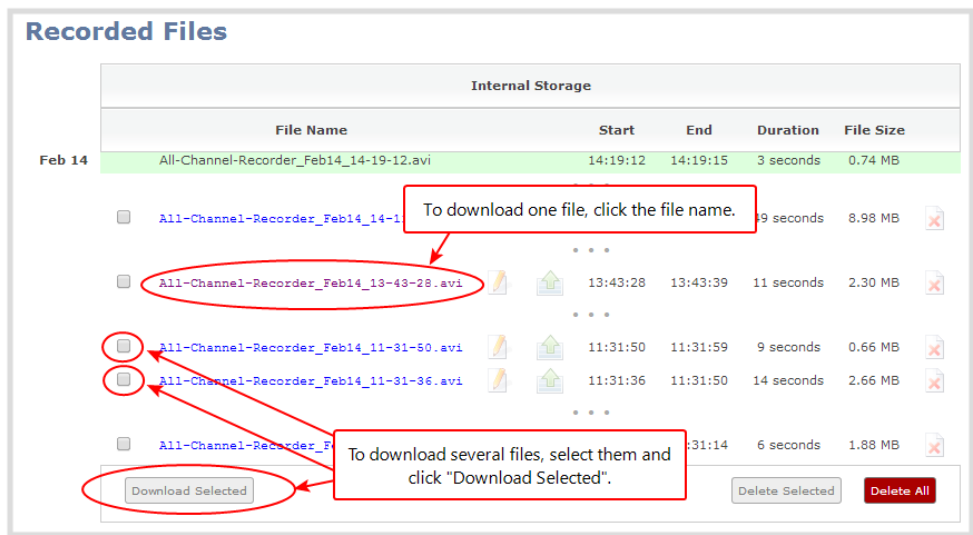
Download recorded files manually

Recordings can be manually downloaded from the web interface. You should consider deleting them from internal storage after you complete the download. See [Delete recorded files manually](#), below.

This procedure explains how to download files to your admin computer. See [File and recording transfer](#) for information on transferring files to a USB drive connected to the system.

To download recordings to your admin computer:

1. Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).
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.

Extract tracks from a recording

Recorders combine multiple channels and audio sources together in a single multi-track file. If desired, you can create a copy of a recording with 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 by clicking the extracted track filename. See **Download recorded files manually**

To create a duplicate recording file with only select tracks:

1. Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).
2. Select the recorder from the Recorders section; the recorder page appears.
3. Find the file you want to duplicate and click the up arrow icon next to it; a list of tracks appears.

Recorded Files

Internal Storage

	File Name	Start	End	Duration	File Size	
Feb 14	All-Channel-Recorder_Feb14_14-19-12.avi	14:19:12	14:31:14	12m 2s	135.90 MB	
	...					
	<input type="checkbox"/> All-Channel-Recorder_Feb14_14-11-06.avi	14:11:06	14:11:55	49 seconds	8.98 MB	
	...					
	<input type="checkbox"/> All-Channel-Recorder_Feb14_13-43-28.avi	13:43:28	13:43:39	11 seconds	2.30 MB	
	...					
	<input type="checkbox"/> All-Channel-Recorder_Feb14_11-31-50...	11:31:59	11:31:59	9 seconds	0.66 MB	
	<input type="checkbox"/> All-Channel-Recorder_Feb14_11-31-36...	11:31:50	11:31:50	14 seconds	2.66 MB	
	...					
	<input type="checkbox"/> All-Channel-Recorder_Feb14_11-31-08...	11:31:14	11:31:14	6 seconds	1.88 MB	

1: Channel 1:video
 2: D2P85606.video:video
 3: D2P85606.vga:video
 4: Channel 9:audio
 5: Channel 9:video

Download Selected Extract tracks Cancel Delete Selected Delete All

4. Select the track(s) 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 duplicate of the recording is made with only the selected tracks.

Recorded Files

Internal Storage

	File Name	Start	End	Duration	File Size	
Feb 14	All-Channel-Recorder_Feb14_15-19-14.avi	15:19:14	15:34:33	15m 19s	170.93 MB	
	<input type="checkbox"/> All-Channel-Recorder_Feb14_14-49-14.avi	14:49:14	15:19:14	30m 0s	338.78 MB	
	<input type="checkbox"/> All-Channel-Recorder_Feb14_14-19-12.avi	14:19:12	14:49:14	30m 2s	337.45 MB	
	...					
	<input type="checkbox"/> All-Channel-Recorder_Feb14_14-11-06.avi	14:11:06	14:11:55	49 seconds	8.98 MB	
	...					
	<input type="checkbox"/> All-Channel-Recorder_Feb14_13-43-28.avi	13:43:28	13:43:39	11 seconds	2.30 MB	
	<input type="checkbox"/> All-Channel-Recorder_Feb14_13-43-28.avi				0.37 MB	
	...					
	<input type="checkbox"/> All-Channel-Recorder_Feb14_11-31-50.avi	11:31:50	11:31:59	9 seconds	0.66 MB	
	<input type="checkbox"/> All-Channel-Recorder_Feb14_11-31-36.avi	11:31:36	11:31:50	14 seconds	2.66 MB	
	...					
	<input type="checkbox"/> All-Channel-Recorder_Feb14_11-31-08.avi	11:31:08	11:31:14	6 seconds	1.88 MB	

Download Selected Duplicate Track Delete Selected Delete All



Only one duplicate recording is saved per recording file. If you create a second duplicate recording, it will overwrite the previous copy. Download the file with your extracted tracks to preserve it.

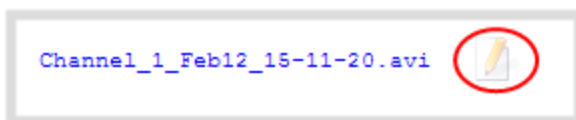
Rename recorded files

Recording files are named based on the filename prefix specified during configuration. If needed, you can rename them to something more descriptive.

You can also change the default naming mechanism. See [Configure recording file size and type](#) for more details about setting filename prefixes.

To rename recordings:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Find the recordings by channel or by recorder. See [View list of recorded files](#).
3. Select the pencil and paper icon next to the filename you wish to change.



4. Type the new file name and press enter when finished.



The web interface keeps track of the filename extension (i.e. .avi) so you do not need to include it when renaming the file.

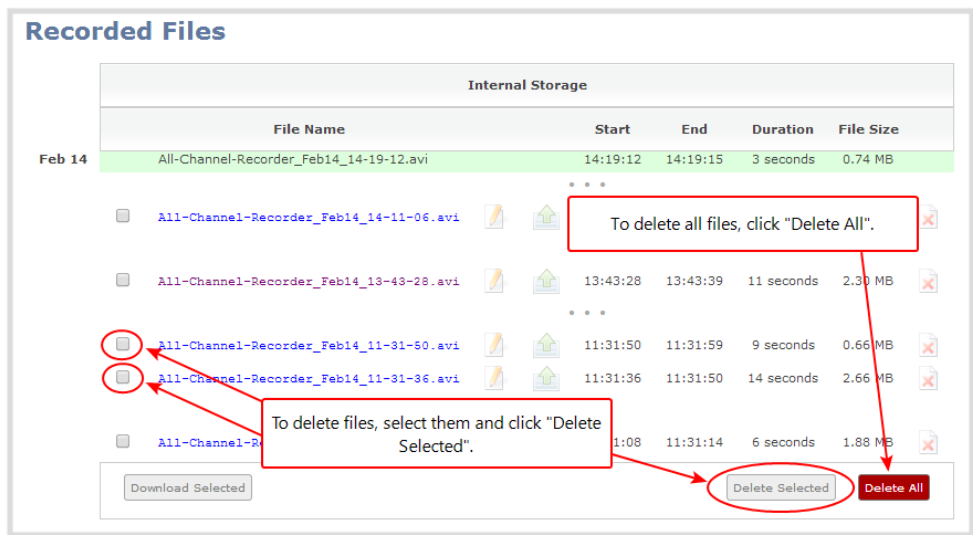
Delete recorded files manually

Recordings can be manually deleted via the web interface. 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.

If you want to delete all the files on the system, follow this procedure for each channel and recorder listed in the web interface.

To delete recordings:

1. Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).
2. Find the recordings by channel or by recorder. See [View list of recorded files](#).



- 3. To delete an individual file:
 - a. Click the X icon to the right of a file entry to request deletion; a confirmation dialog appears.
 - b. Click OK on the confirmation dialog.
- 4. To delete multiple files for the current channel or recorder:
 - a. Select the check box next to the recordings you wish to delete from this channel or recorder.
 - b. Click **Delete Selected**; a confirmation dialog appears.
 - c. Click **OK** on the confirmation dialog.

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).

- 5. To delete all files for the current channel or recorder:
 - a. Click **Delete All**; a confirmation dialog appears.
 - b. Click **OK** on the confirmation dialog.

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

Your Pearl can be configured to automatically upload recordings from local storage to a network storage location or an attached USB drive.

We call this process Automatic File Upload or AFU for short.

This section discusses the following generic automatic upload topics:

- [Automatic file upload \(AFU\) overview](#)
- [Choose files to include in AFU](#)
- [Enable and set timing for AFU](#)

And the following specific configurations based on the location of upload:

- [AFU to an FTP server](#)
- [AFU using RSync](#)
- [AFU using CIFS](#)
- [AFU to a secure FTP server](#)
- [AFU using SCP](#)
- [AFU or copy to USB drive](#)
 - Automatic
 - As a one-time copy
 - Manually

Lastly, this section describes how to view file upload logs and manage the AFU queue:

- [View the AFU log](#)
- [Manage the AFU queue](#)

Automatic file upload (AFU) overview

Pearl can automatically upload files to an accessible off-system storage location.



Do not reboot Pearl with USB stick inserted. Doing so will result in a failure to boot.

The following types of off-system storage are supported for AFU: **FTP, CIFS, RSync, SFTP, SCP** and **USB Drive**.



Only **one** type of AFU can be used at once.

Files are uploaded once (i.e. are automatically not re-uploaded during future sessions) and a log is kept showing the file transfers (see below for details on viewing the log). The first transfer occurs after the configured amount of time expires or after the current file completes recording. If connection is lost during the transfer, the transfer is automatically restarted when the connection is reestablished.

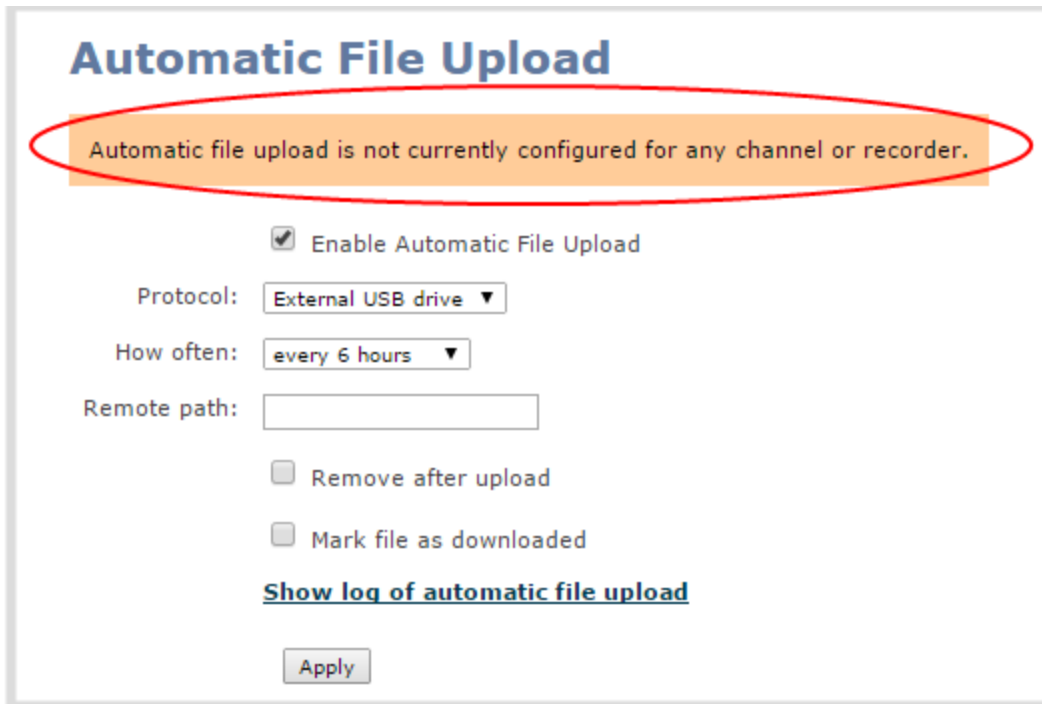
By default, channels and recorders are not configured to support automatic file upload for their recorded files. You must enable this feature for each channel or recorder you wish to include in your automatic file transfers.

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 format, and each file will be uploaded when upload capacity becomes available.

Choose files to include in AFU

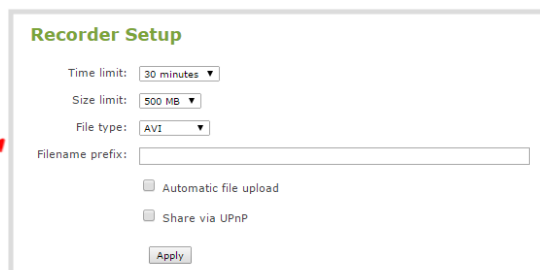
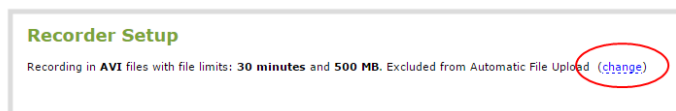
When configuring automatic file upload (AFU) you need to tell the system which channels and recorders you want included in the upload schedule.

When you log into the system and attempt to configure your desired type of AFU you see the following warning in the Automatic File Upload configuration page if no channels or recorders are configured to be part of AFU.



For each channel or recorder you want to add to your AFU schedule:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. For a channel recording:
 - a. Click the desired channel; the channel menu expands.
 - b. Select the **Recording** link for the channel; the Recording page opens.
3. For a recorder:
 - a. Click the desired recorder link from the Recorders section; the recorder configuration page opens.
4. Select the **change** link under Recorder Setup; the recorder setup section expands. (The setup page looks slightly different for Recorders, but the options are the same.)



5. Check the **Automatic file upload** check box.
6. Click Apply; the Recording page is refreshed and the new settings are reflected.

Recorder Setup

Recording in **AVI** files with file limits: **30 minutes** and **500 MB**. Included into Automatic File Upload ([change](#))

Now that AFU is enabled for your desired set of files, enable AFU and configure your desired mechanism.

Enable and set timing for AFU

After configuring the channels and recorders to include in your AFU schedule, you must enable AFU and configure the frequency of transfers.



Files saved before you complete automatic file upload configuration are not part of the automatic upload. Manual file transfer is required for these files. See **Download recorded files manually**.

To enable and configure frequency automatic uploads:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select **Automatic File Upload** from the Configuration section; the Automatic File Upload configuration page opens.

Automatic File Upload

Enabled for: [HDMI-A](#)

Enable Automatic File Upload

Protocol: External USB drive ▼

How often: every 6 hours ▼


Remote path:

Remove after upload

Mark file as downloaded

[Show log of automatic file upload](#)

Apply

 If your screen does not indicate that AFU is enabled for at least one channel or recorder, return to **Choose files to include in AFU** [Enable and set timing for AFU](#)

3. Select the **Enable Automatic File Upload** checkbox.
4. Specify how often automatic updates should happen.

The first transfer occurs after the specified amount of time expires, or after the current file completes recording. I.e. if the value is set to every hour and five videos are saved the first hour, those five videos are uploaded after the first hour, and one hour later the videos saved in the second hour are uploaded.


The following table describes the available options.

Table 35 Automatic File Upload 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 file size and type .
Every hour	The system uploads completed recordings every hour.

Name	Description
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.

- Indicate the remote path, if desired. If no path is specified, the files are copied to the root folder of the destination file system.



If the remote path does not exist on the remote server or USB drive, the file transfer fails.

- If desired, check **Remove after upload** to have the files deleted from local storage when upload completes.
- If desired, 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.
- Select the protocol or destination for upload. The following table describes the options.

Table 36 Automatic File Upload Interval Options

Name	Description
FTP Client	The system uploads to an FTP server.
RSync Client	The system uploads to a network location using RSync to copy the file.
CIFS Client	The system uploads to a network location using CIFS (also known as SMB or samba) such as a shared folder on a Windows machine.
SFTP Client	The system uploads to a secure FTP server. Authentication is done either by password or uploaded SSH key.
SCP Client	The system performs secure copy (SCP) to a remote server. Authentication is done either by password or uploaded SSH key.
External USB Drive	The system uploads to a USB drive connected directly to the system.

- Follow one of the procedures below to configure your selected protocol or transfer type.
 - AFU to an FTP server
 - AFU using RSync
 - AFU using CIFS

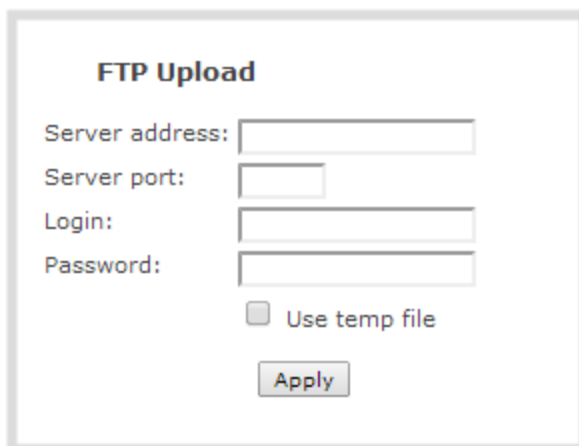
- [AFU to a secure FTP server](#)
- [AFU using SCP](#)
- [AFU or copy to USB drive](#)

AFU to an FTP server

This procedure assumes you have completed the steps in [Enable and set timing for AFU](#) and wish to continue with configuration of upload to an FTP Server.

To configure upload to an FTP server:

1. Select **FTP Client** from the protocol drop down list in the Automatic File Upload configuration page; the lower half of the page reflects the selection.



The screenshot shows a configuration window titled "FTP Upload". It contains four text input fields: "Server address:", "Server port:", "Login:", and "Password:". Below these fields is a checkbox labeled "Use temp file" which is currently unchecked. At the bottom of the form is an "Apply" button.

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**; if there are any problems the system notifies you with a message: One or more parameter values are not valid and those were not applied!

The following table describes the options applicable to configuring upload to an FTP server.

Table 37 FTP Automatic Upload Configuration Options

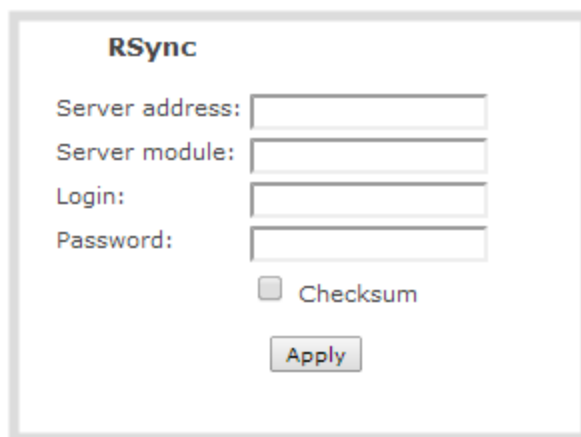
Name	Description / Options
Server address	The IP address (or fully qualified domain name) of the FTP server.
Server port	The port used by the target FTP server. Standard port is 21.
Login	Username for the FTP server.
Password	Password for the FTP user.
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4 or .avi).

AFU using RSync

This procedure assumes you have completed the steps in [Enable and set timing for AFU](#) and wish to continue with configuration of upload using RSync.

To configure upload using RSync:

1. Select **RSync Client** from the protocol drop down list in the Automatic File Upload configuration page; the lower half of the page reflects the selection.



RSync

Server address:

Server module:

Login:

Password:

Checksum

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**; if there are any problems the system notifies you with a message: One or more parameter values are not valid and those were not applied!

The following table describes the options applicable to configuring upload to an RSync server.

Table 38 RSync Automatic File Upload Configuration Options

Name	Description / Options
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.

AFU using CIFS

This procedure assumes you have completed the steps in [Enable and set timing for AFU](#) and wish to continue with configuration of upload using CIFS (also known as SMB or samba).

To configure upload using CIFS:

1. Select **CIFS Client** from the protocol drop down list in the Automatic File Upload configuration page; the lower half of the page reflects the selection.

CIFS Upload

Server port:

Server address:

Server share:

Domain:

Login:

Password:

Use temp file

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**; if there are any problems the system notifies you with a message: One or more parameter values are not valid and those were not applied!

The following table describes the options applicable to configuring upload to a CIFS server.

Table 39 CIFS Automatic File Upload Configuration Options

Name	Description / Options
Server Port	The CIFS server port. Leave blank to use the default port, or enter the port used for your CIFS server.

Name	Description / Options
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).

AFU to a **secure** FTP server

This procedure assumes you have completed the steps in [Enable and set timing for AFU](#) and wish to continue with configuration of upload to a secure FTP Server (SFTP).

To configure upload to a secure FTP (SFTP) server:

1. Select **SFTP Client** from the protocol drop down list in the Automatic File Upload configuration page; the lower half of the page reflects the selection.

SFTP Upload

Server address:

Server port:


Login:

Password:


Use temp file



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. 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. If desired, scroll down to the section labelled **SSH identity for SCP and SFTP clients**.
 1. If no identity is uploaded, or to upload a new identity (overwrites the old identity):
 - a. Click **Choose File**; a file selection dialog opens.
 - b. Select the private key file from your hard drive and click **Open**.

 The system accepts RSA keys for SSH-1; DSA, ECDSA, EC25519 and RSA for SSH-2. Keys must be in **OpenSSH** format.
 - c. Click **Upload** to upload the file.
 2. Use the **Test your key** field to test your uploaded key against the secure server, if desired.
8. Click **Apply**; if there are any problems the system notifies you with a message: One or more parameter values are not valid and those were not applied!

The following table describes the options applicable to configuring upload to a SFTP server.

Table 40 SFTP Automatic Upload Configuration Options

Name	Description / Options
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.

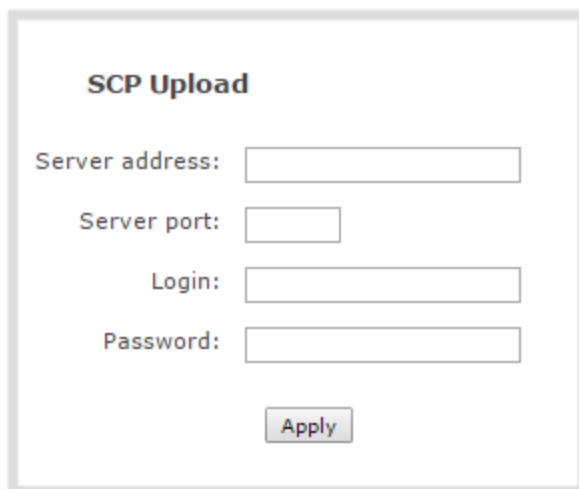
Name	Description / Options
Password	Password for the SFTP user.
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4 or .avi).

AFU using SCP

This procedure assumes you have completed the steps in [Enable and set timing for AFU](#) and wish to continue with configuration of upload via secure copy (SCP).

To configure upload via SCP:

1. Select **SCP Client** from the protocol drop down list in the Automatic File Upload configuration page; the lower half of the page reflects the selection.



SCP Upload


Server address:

Server port:

Login:


Password:

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. 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. If desired, scroll down to the section labelled **SSH identity for SCP and SFTP clients**.

1. If no identity is uploaded, or to upload a new identity (overwrites the old identity):
 - a. Click **Choose File**; a file selection dialog opens.
 - b. Select the private key file from your hard drive and click **Open**.

 The system accepts RSA keys for SSH-1; DSA, ECDSA, EC25519 and RSA for SSH-2. Keys must be in **OpenSSH** format.

- c. Click **Upload** to upload the file.
 2. Use the **Test your key** field to test your uploaded key against the secure server, if desired.
7. Click **Apply**; if there are any problems the system notifies you with a message: One or more parameter values are not valid and those were not applied!

The following table describes the options applicable to configuring upload using SCP.

Table 41 *SCP Automatic Upload Configuration Options*

Name	Description / Options
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 SFTP server.
Password	Password for the SFTP user.


AFU or copy to USB drive

The system is equipped with USB ports that can be used to copy files from internal storage to external USB flash drives or hard drives. An example use of this feature is to provide speakers with a copy of their presentation before they leave the presentation venue.

The external drive must be formatted with one of the following file systems:


- FAT16
- FAT32
- XFS
- EXT2
- EXT3
- EXT4

- NTFS

 Do not power up the system with a USB drive connected. Doing so can cause unpredictable problems with system startup.

File transfer to a USB drive occurs in one of the following ways. This section describes the procedures.

- AFU to a USB drive
- One-time copy/move of all recorded files to USB drive
- Manually copy recorded files to USB drive
- View available USB storage space
- Safely eject the USB drive

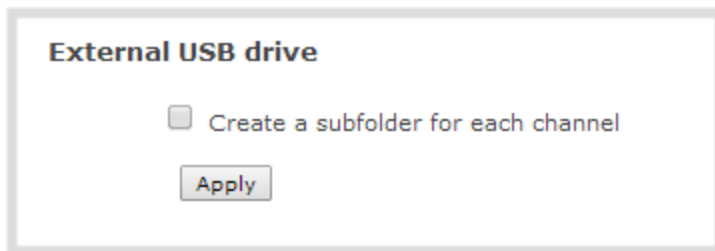
 Only one copy or move to USB operation is permitted at a time, even though the UI may appear to let you start a second one. Please wait until the first is complete before starting a new operation.

AFU to a USB drive

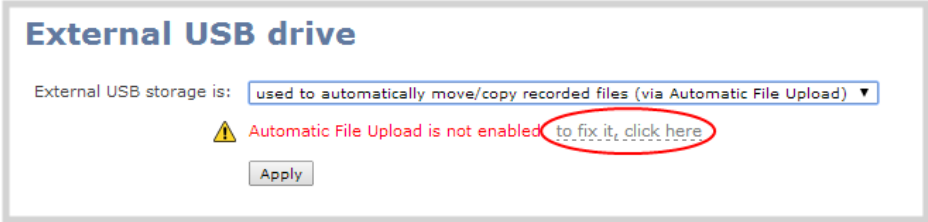
This procedure assumes you have completed the steps in [Enable and set timing for AFU](#) and wish to continue with configuration of upload to a USB drive.

To configure automatic upload to a USB drive:

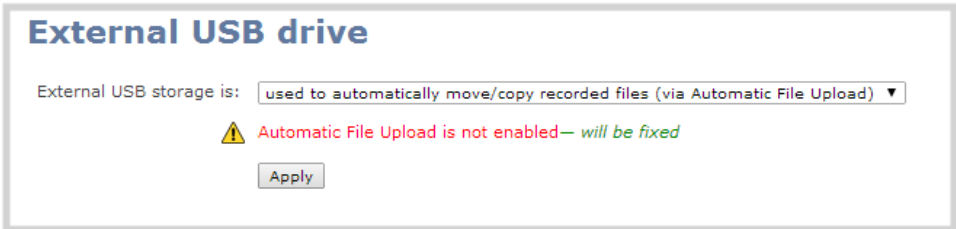
1. Insert the properly formatted USB drive into one of the system’s USB ports. (USB ports are available on both the back and the front of Pearl for rackmount models and the back for the desktop model.)
2. Select **External USB Drive** from the protocol drop down list in the Automatic File Upload configuration page; the lower half of the page reflects the selection.





3. If your Automatic File Upload setting conflicts with your new USB drive setting, a message is displayed.



4. Click the fix link.




 Using the fix 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 re-configure FTP, RSYNC, or CIFS.

 After clicking the fix link, the text changes to "will be fixed", however changes are saved only after clicking **Apply**.


- 5. Select **Create a subfolder for each channel** to have recordings organized by channel.
- 6. Click **Apply**; the changes are saved.

One-time copy/move of all recorded files to USB drive

When configured to make a one-time copy of files, the system will automatically begin to copy files to an inserted USB drive, starting with the newest recording. Files will continue to copy until all are copied, the specified maximum number of files is copied, or the target drive runs out of storage space.

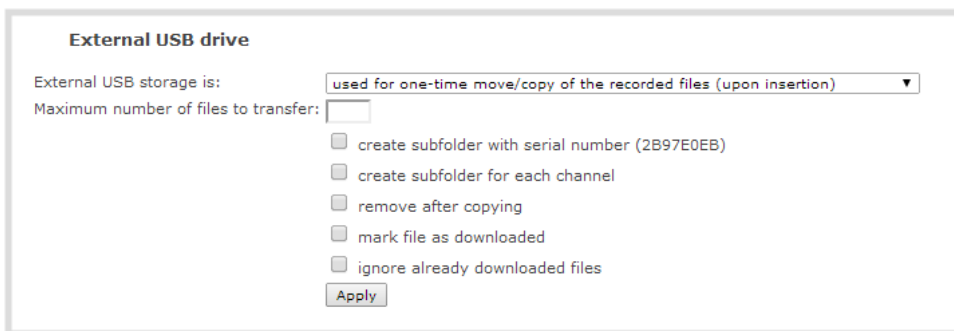
 The file currently being recorded (if any) cannot be transferred until recording is completed.

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

 Ideally only USB drives with visible activity indicators should be used.

To configure a one-time copy of all recorded files to a USB drive:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **External USB Drive** link in the Configuration section; the External USB Drive configuration page is displayed.
3. Select **used for one-time move/copy of the recorded files (upon insertion)** from the drop down list.



4. Select the appropriate check boxes based on the descriptions provided in the following table. If your USB drive does not have activity indicators it is suggested you select either remove after copying or mark file as downloaded so you know when the transfer is complete.

Table 42 One-Time Transfer/Copy to External USB Drive 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.

5. Click **Apply**; the changes are saved.



If a conflict is reported regarding the Automatic file upload, go to the Automatic File Upload configuration page and disable automatic file upload or switch it to a non-USB based upload type. Repeat the steps above.

6. Insert the properly formatted USB drive into one of the system’s USB ports; the drive is recognized and the transfer begins. If the drive has an activity indicator light, it flashes during the transfer.
7. When the activity light stops flashing, remove the USB drive.
8. If your USB drive does not 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 the USB drive** when you are satisfied all files have been copied, or if you see the USB drive is out of storage space ([View available USB storage space](#)).

Manually copy recorded files to USB drive

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

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 drive:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **External USB Drive link** in the Configuration section; the External USB Drive configuration page is displayed.
3. Select **used to manually move/copy selected files via web interface** from the drop down list.

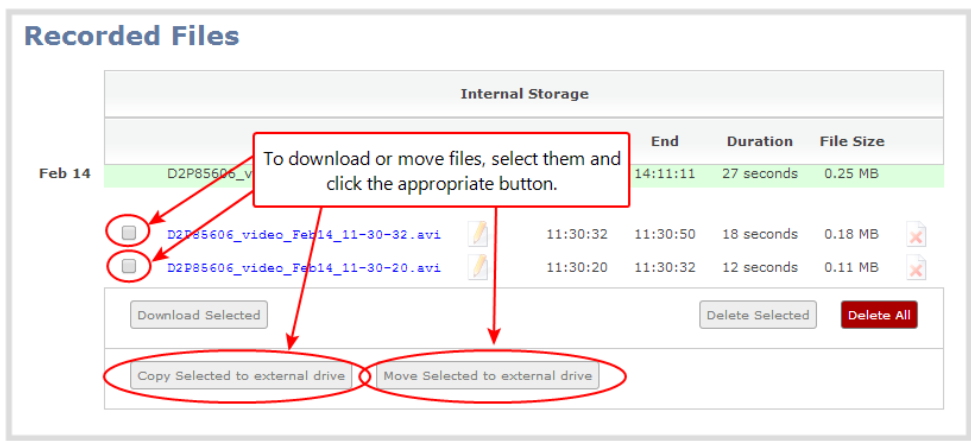


4. Click **Apply**; the changes are saved.



If a conflict is reported regarding the Automatic file upload, go to the Automatic File Upload configuration page and disable automatic file upload or switch it to a non-USB based upload type. Repeat the steps above.

5. Insert your USB drive in an available USB port on the system. (It is recommended you only use one USB drive at a time.) Note: the USB ports are available on both back and the front of Pearl for rackmount models and the back for the desktop model.
6. To download files for a specific channel:
 - a. Select the desired channel from the Channels list
 - b. Click the **Files Archive** link for the selected Channel
7. To download files for a recorder:
 - a. Select the desired recorder from the Recorders list
8. Select the check box next to the files you wish to download. In the example below the topmost file is still recording and cannot be downloaded.



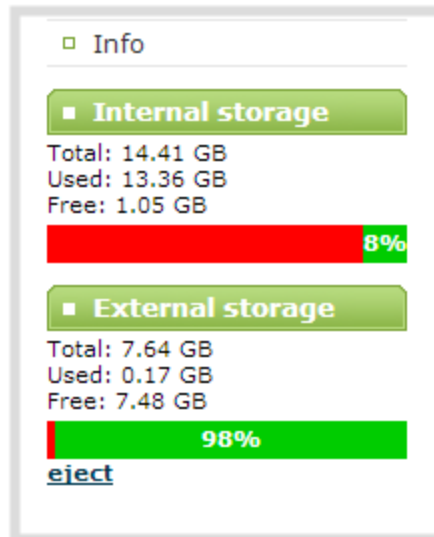
9. To copy the files to the USB drive:
 - a. Click **Copy Selected to external drive**
10. To move the files to the USB drive (i.e. erase the files after the copy)
 - a. Click **Move Selected to external drive**
11. Repeat the steps to select a channel or recorder and copy or move files to the external drive until you have copied all the files you wish.
12. Follow the steps to [Safely eject the USB drive](#).

View available USB storage space

When you insert a USB drive in an available port of Pearl 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 Web Interface.

To see the available USB storage space:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Insert your USB drive in an available USB port on the system. (It is recommended you only use one USB drive at a time.) (Note: the USB ports are available on both the back and the front of Pearl for rackmount models and the back for the desktop model.)
3. Scroll to the bottom of the Web Interface page; external USB storage is displayed under internal storage space.

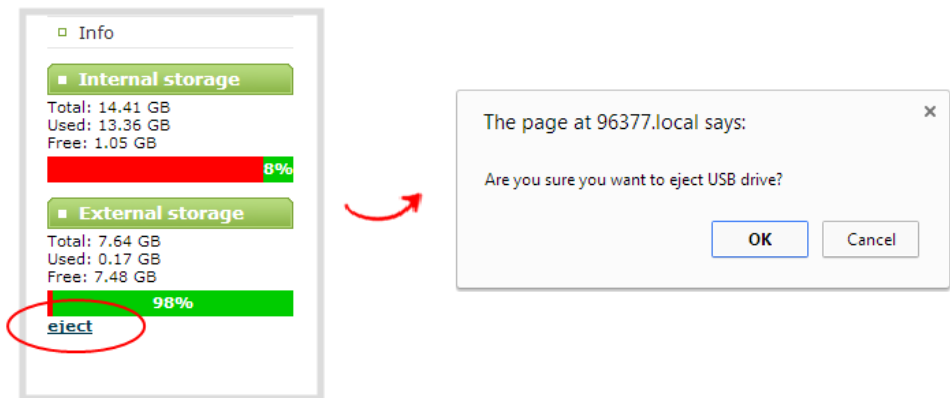


Safely eject the USB drive

When you have completed work with the USB drive you can safely eject it by using the link at the bottom of the Web Interface page.

To safely eject the USB drive:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Scroll to the bottom of the Web Interface page; click the eject link below external storage space.



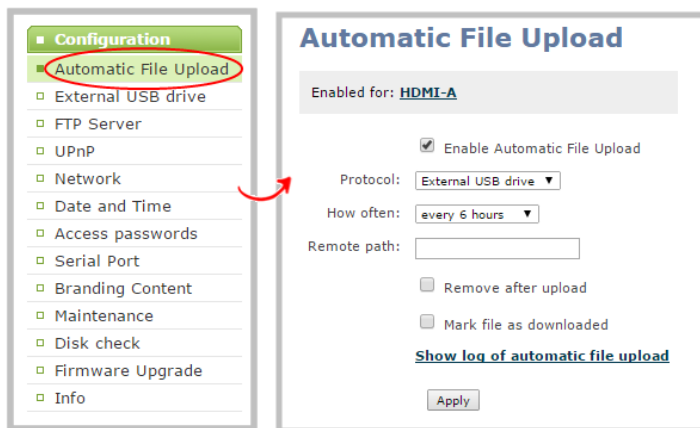
3. When prompted, click OK to confirm that you want to eject the USB drive.
4. Disconnect the USB drive from the system.

View the AFU log

A log is kept of automatic file uploads.

To view the log:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select **Automatic File Upload** from the Configuration section; the Automatic File Upload configuration page opens.



3. Click the **Show log of automatic file upload** link; the log page opens. Note the page is blank if there are no logs present.
4. Click the browser's back button when you are done.



Manage the AFU queue

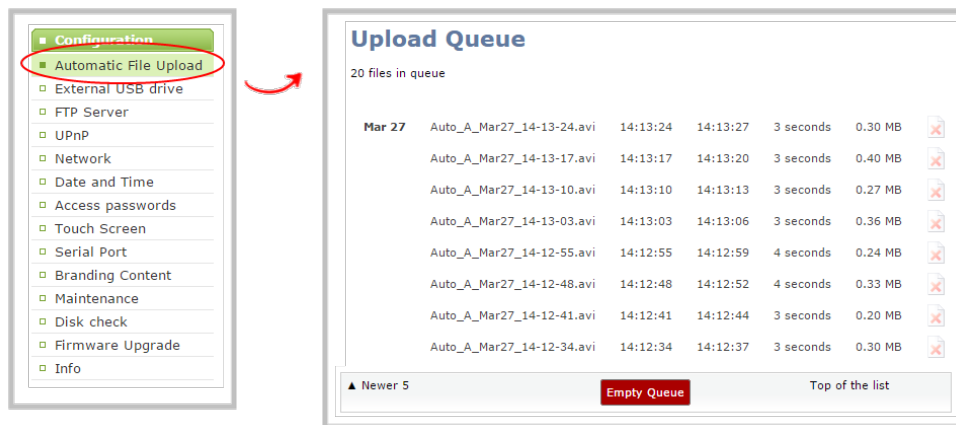
The AFU queue displays a list of recording files waiting to be uploaded. Individual file details can be viewed using the web interface.

Access the AFU queue

Accessing the AFU queue allows you to view the list of files queued for upload using the web interface.

To access the AFU queue:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
3. From the web interface, click **Automatic File Upload**; if there are files to be uploaded, they are displayed under the Upload Queue header.

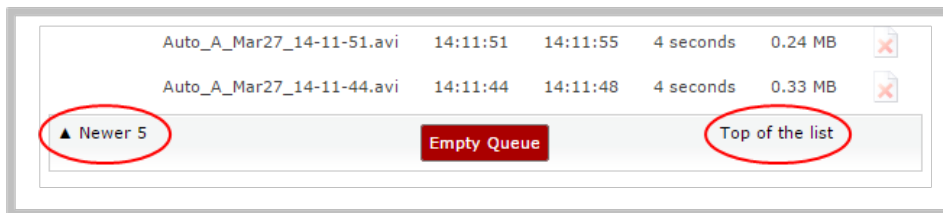



View content in the AFU queue

There are several buttons in the web interface that allow you the ability to control how you see your queued content.

To control how you view content in the AFU queue:

1. Navigate to the bottom of the upload queue list and manipulate the list view using the **Newer 5** and **Top of the List** buttons.



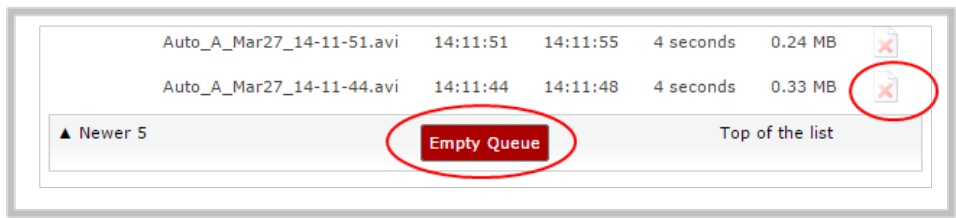
 The upload queue can display only 15 files at one time. Additional content is still stored and is viewed in increments of five files using the **Newer 5** button.

Delete content in the AFU queue

Files can be deleted from the upload queue, either individually or as a group.

To remove 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.



Local FTP server

Pearl 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.

This section discusses the following FTP Server topics.

- [Configure the local FTP server](#)
- [Using the local FTP Server](#)


Configure the local FTP server

To configure your sysetem's local FTP server:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **FTP Server** link in the Configuration menu; the FTP Server configuration page opens.




3. To enable the FTP server:
 - a. Select the **Enable FTP access** check box.
 - b. Select a user from the **FTP user name** drop down.




The ftp password is the regular access password for the selected user. See **User administration** for details on user names and passwords.

- c. Click **Apply**.

4. To allow the FTP user to delete files:
 - a. Select the **Enable FTP DELETE command** check box.
 - b. Click **Apply**.

 Any currently logged in ftp users must log out and back in again to have access to the command.

5. To disable the FTP server:
 - a. De-select the **Enable FTP access** check box.
 - b. Click **Apply**.
6. To disable file deletion by FTP:
 - a. De-select the **Enable FTP DELETE command** check box.
 - b. Click **Apply**.

 Any currently logged in users will continue to have access to the delete command until they log out and log in again.

The following table summarizes the options for configuring the local FTP server.

Table 43 *FTP Server Configuration Options*

Name	Description / Options
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.

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 the system.



The system stores files in a folder structure with a folder for each channel and a folder for each recorder. 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). Channel and recorder numbers are displayed next to the name of the channel or sources in the web admin interface. See [Channels](#) and [Recorders](#).

To get started you will need:

- The IP address of your system (found in the **Network** configuration menu)
- An FTP tool
- The username and password for your FTP user (See [Configure the local FTP server](#))

In the example below, the IP address of Pearl 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); the connection is opened.
5. Use the dir command to see the file structure.

```

Administrator: C:\Windows\system32\cmd.exe - ftp 192.168.1.210

c:\>ftp 192.168.1.210
Connected to 192.168.1.210.
220 Operation successful
User (192.168.1.210:(none)): admin
331 Password
Password:
230 Operation successful
ftp> dir
200 Operation successful
150 Directory listing
total 48
drwxrwxrwx  4 0      0      4096 Feb 12 20:37 video1
drwxrwxrwx  3 0      0      4096 Feb 12 19:35 video10
drwxrwxrwx  3 0      0      4096 Feb 13 14:50 video11
drwxrwxrwx  2 0      0      4096 Feb 11 15:22 video2
drwxrwxrwx  3 0      0      4096 Feb 11 15:38 video3
drwxrwxrwx  3 0      0      4096 Feb 12 14:43 video4
drwxrwxrwx  3 0      0      4096 Feb 12 14:44 video5
drwxrwxrwx  3 0      0      4096 Feb 12 15:22 video6
drwxrwxrwx  3 0      0      4096 Feb 12 15:22 video7
drwxrwxrwx  3 0      0      4096 Feb 12 15:22 video8
drwxrwxrwx  3 0      0      4096 Feb 12 15:52 video9
drwxrwxrwx  4 0      0      4096 Feb 13 14:35 videom1
226 Operation successful
ftp: 793 bytes received in 0.00Seconds 793000.00Kbytes/sec.
ftp>
    
```

6. Use dir or your tool's GUI to look in each folder for recordings.
7. Use get or your tool's transfer mechanism to transfer files to your computer.

```
ftp> dir videom1
200 Operation successful
150 Directory listing
total 920
-rw-r--r--  1 0      0      934130 Feb 13 14:35 UGA.1392302138.Recorder_1.avi
drwxrwxrwx  2 99     99     4096 Feb 12 20:44 trash
226 Operation successful
ftp: 163 bytes received in 0.00Seconds 163.00Kbytes/sec.
ftp> get videom1/UGA.1392302138.Recorder_1.avi
200 Operation successful
150 Opening BINARY connection for videom1/UGA.1392302138.Recorder_1.avi (934130 bytes)
226 Operation successful
ftp: 934130 bytes received in 0.08Seconds 12131.56Kbytes/sec.
ftp>
```

8. If enabled in the FTP configuration page, delete the file after downloading it by issuing the delete command, or using your tool's delete mechanism.



If the delete command is not enabled, attempting to delete a file will result in an Unknown Command error.

PART 5: Maintenance

This section covers topics that will keep your Pearl running smoothly. It also covers the mobile/tablet operator interface and ways to configure and operate your system using third party tools via HTTP or RS-232.

Specific topics covered are:

- Mobile / tablet operator interface
- Power down and system restart
- Perform factory reset
- Firmware upgrade
- Support
- Storage disk maintenance
- Third party integration

Mobile / tablet operator interface

Epiphan's tablet interface is designed for touch-screen devices. Use your tablet or mobile device to perform confidence checks and basic operator tasks such as verifying disk space or starting and stopping recording.

This section describes procedures for the following topics:

- [Connect to the tablet interface](#)
- [Confidence monitoring using the tablet interface](#)
- [Verify disk space via the tablet interface](#)
- [Control recording via the tablet interface](#)
- [Switch to the full admin interface](#)

Connect to the tablet interface

To get started with the tablet interface you can connect to it in one of the following ways.



The device connecting to the tablet interface must be on the same network as the Pearl or must be physically connected to it via USB.

- [Use the browser over Ethernet](#)
- [Use tethering on your device](#)
- [Use the mobile version of Epiphan Connect](#)

Use the browser over Ethernet

You can connect to the tablet interface with a browser on your admin computer, tablet, or touch-screen device.

To connect to the tablet interface:

1. Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).
2. Modify the URL in the browser to have /m after the existing text and press Enter; the tablet interface opens. (If you forget the /m, the system will direct you to the mobile or standard interface, depending on information sent by your device's browser).

```
http://<ip address of system>/admin/m  
or  
http://<serial number of device>.local/admin/m
```

For example: `http://192.168. 1.163/admin/m` or `http://95dd40d5.local/admin/m`

In the future you can go directly to the IP address above and login from the mobile interface without ever seeing the usual admin interface.

Use tethering on your device

You can use tethering on your mobile device or tablet to connect to the tablet interface. This option requires some configuration through the full admin interface.

To configure use of tethering (perform this once):

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Network** link in the Configuration menu; the network configuration page opens.
3. Select **No tethering** or any option except **Disabled** from the **Use phone/tablet connection**. See [Tether to a mobile network](#) for descriptions of the options.
4. Click Apply.

To use your mobile device or tablet via tethering:

1. Turn on tethering on your device. (See device user manual for instructions.)
2. Connect the device to your Pearl via USB.
3. Use the EpiphanConnect utility (from the Google Play or Apple App store) to find the system and open the tablet admin interface.

Use the mobile version of Epiphan Connect

Epiphan has iOS and Android versions of the Epiphan Connect discovery utility. The mobile versions of the discovery utility automatically open the tablet interface when connecting to the Pearl for administration.

See instructions below for installing the application. The iOS version is available from the Apple App Store and the Android version is available from the Google Play store.

To install the application on your iOS or Android device (perform this once):

1. Open the App Store (for Apple devices) or Google Play store (for Android devices).
2. Search for **EpiphanConnect** (all one word).

3. Download and install the free Epiphan Connect application.

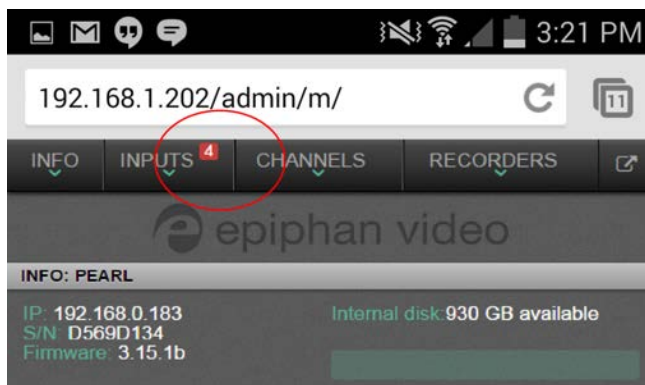
To connect to the device:

1. Once Epiphan Connect is installed, connect to the wifi network where you can access your Pearl.
2. Launch Epiphan Connect; the application searches your network and shows you a list of available Epiphan systems.
3. Find your system in the list. If you have several Epiphan systems, look for the serial number of the one to which you'd like to connect.
4. Select the system by touching the system name; a login prompt is presented.
5. Login as admin or operator; the tablet interface appears.

Confidence monitoring using the tablet interface

When connected to the tablet interface, you can use the **INPUTS** section to monitor the inputs to your system. An auto-updating snapshot of video inputs and an audio level meter is provided for each source.

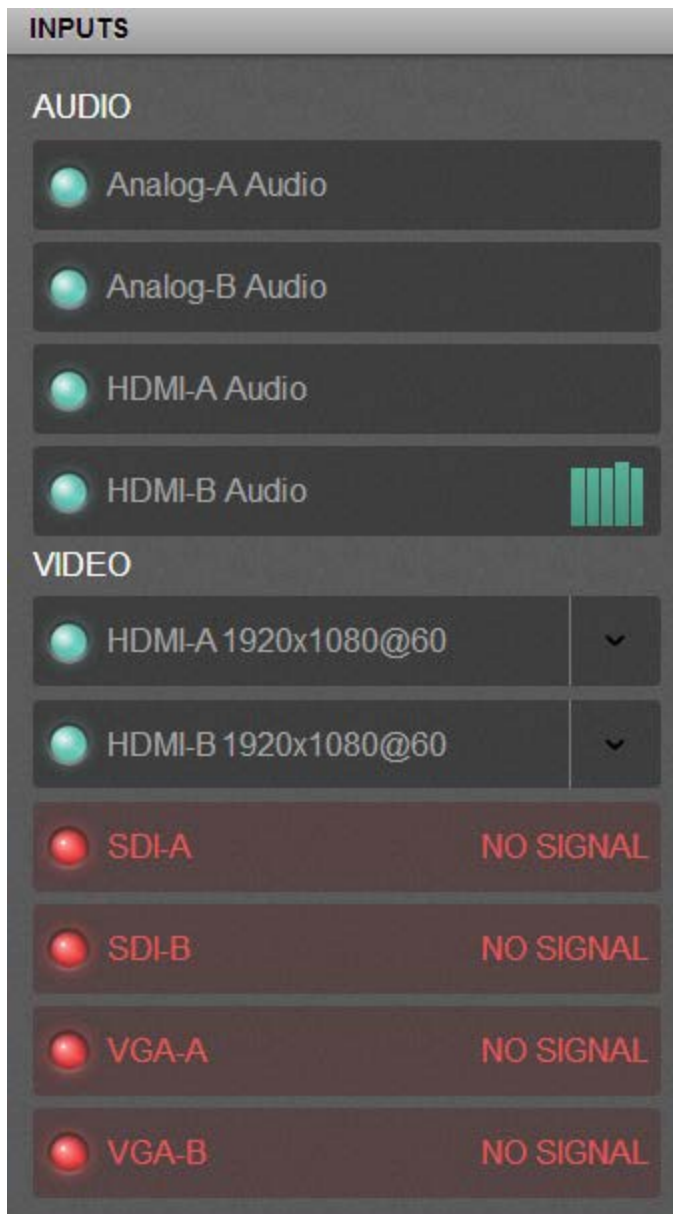
The top of the tablet interface gives you a warning if there are video inputs with no signal. In the example below, 4 video inputs have no signal.



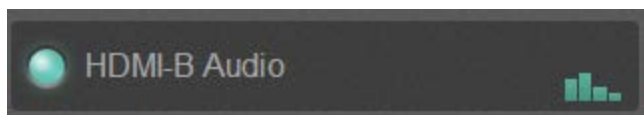
For more detailed information, you can look at each input individually.

To monitor each input:

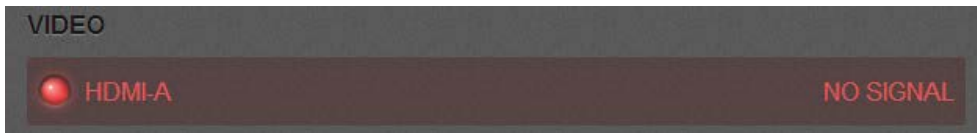
1. Connect to the tablet interface. See [Connect to the tablet interface](#).
2. Login as admin or operator.
3. Scroll to the **INPUTS** section.



- 4. For audio inputs without signal, nothing appears in the audio input bars.
- 5. For audio inputs with signal, the level is shown next to the source name in the audio input bar.



- 6. If a video source has no signal, the name appears red and a note next to the name says NO SIGNAL.



- 7. If the source has a signal, it's frame size and frame rate are displayed beside the source name.
- 8. View a preview of the source by clicking the down arrow in the row for source. (The names of the sources match the names set in the main admin interface.)



Verify disk space via the tablet interface

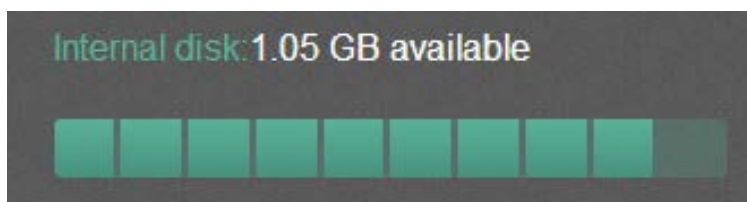
The **INFO** section of the tablet interface lets you know the firmware version, serial number and IP Address of your system. It also shows you the currently available disk space.

To monitor inputs:

- 1. Connect to the tablet interface. See [Connect to the tablet interface](#).
- 2. Login as admin or operator.
- 3. Scroll to the **INFO** section; the currently available disk space is shown.



- 4. If disk space is low, the green bar will be nearly full.



Control recording via the tablet interface

The tablet interface provides a simple way to control recording for your Pearl. You can control recordings for both channels and recorders from the same interface.

To control recording from the tablet interface:

1. Connect to the tablet interface. See [Connect to the tablet interface](#).
2. Login as admin or operator.
3. Scroll to the **CHANNELS** section.

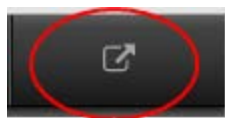


4. Find the channel or recorder from the list under CHANNELS. (The names of the channels and recorders match the names set in the full admin interface.)
5. Click the down arrow in the row for the desired channel or recorder.
6. Use the **START**, **STOP**, and **RESET** buttons to control recording.

Switch to the full admin interface

To switch from the tablet interface to the full admin interface:

1. Connect to the tablet interface. See [Connect to the tablet interface](#).
2. Login as admin or operator.
3. Click the arrow button at the top right of the screen. Depending on the width of the screen, the button may say extended view.



Power down and system restart

This section covers the following topics:

- [Restarting the device via the web interface](#)
- [Shutting down the device via the web interface](#)
- [Shutting down the device manually](#)

Restarting the device via the web interface

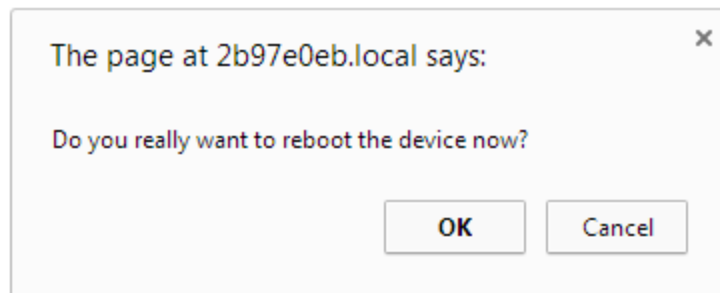
Pearl's web interface allows you to reboot the system.

To restart the system:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.



3. Click the **Reboot Now** button; a confirmation dialog appears.



4. Click **OK**.

Shutting down the device via the web interface

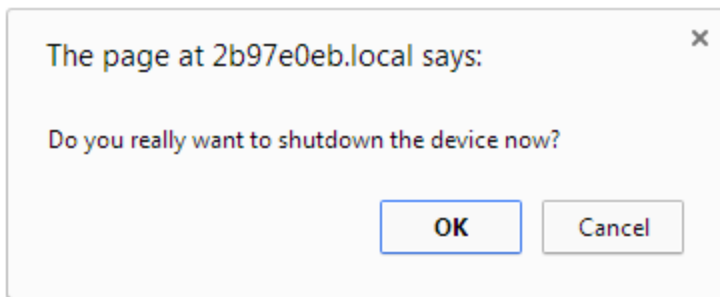
The Pearl web interface allows you to shut down the system.

To shut down the system:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.



3. Click the **Shutdown Now** button; a confirmation dialog appears.



4. Click OK.


Shutting down the device manually

You can manually shut down the Pearl via the button physically located on the system.

Note: For rackmount models of Pearl, the power button is located at the front of the system. For the desktop model, it's found on the back.

To shut down the system manually:

1. Double-click (two successive fast presses and releases) the system power button to initiate a safe power down; the system shuts down.



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

Save and restore device configuration

The previously used backup and restore procedure is replaced by configuration presets, which are the perfect way to backup all or any set of your configuration items for future import back to the same system or another. See [Configuration presets](#) for more details.

Perform factory reset


If you've been testing with your Pearl and are ready to reset it back to factory settings, you can do this through the web interface.

This section covers the following topics:

- [Restore factory configuration via the web interface](#)


Restore factory configuration via the web interface

The web interface allows you to restore the factory configuration to return your Pearl back to the original settings it had when you purchased it.



Restoring the factory settings erases everything on the system. This includes all your source settings, channels, configuration presets, network settings and all saved files.

Consider using the factory default configuration preset if you want to preserve files. See **Configuration presets**.



EDIDs are **not** restored to factory settings with the factory resets. Re-apply factory EDIDs manually using the Source's configuration page.

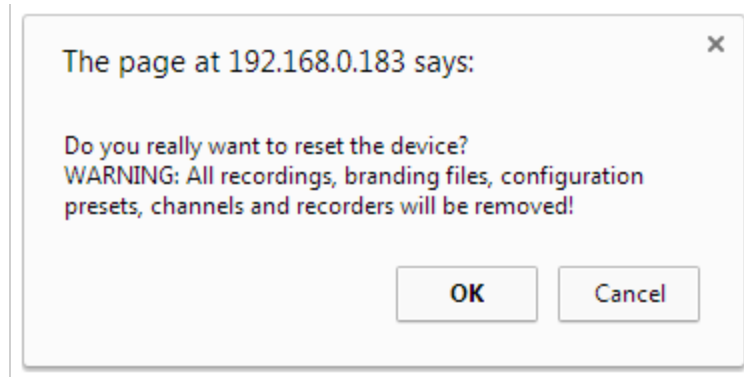
Only proceed if you know this is what you want to do.

To restore the factory configuration via the web interface:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.



3. Click the **Reset** button next to **Factory Reset**; a warning dialog appears asking you to confirm this destructive action.



4. Click **OK** on the warning dialog; the system resets to factory defaults and reboots.
5. Wait for the system to reboot and begin re-configuration.

Firmware upgrade

Epiphan will from time to time issue an updated firmware revision to bring new features to your Pearl. To take advantage of these new features, you will need to install the new firmware on the system.

This section covers the following topics:

- [Check for firmware updates](#)
- [Install firmware](#)

Check for firmware updates

When you register your product with Epiphan you are given a choice to be notified by email of firmware updates for your system. If you selected this choice, you will be notified of updates applicable to Pearl.

If your Pearl has internet access, you can check for updates directly by following the procedure below.

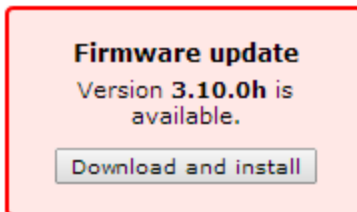
The system will also automatically check for firmware updates if the **Maintenance** page option **Enable connection to maintenance server** is checked.



This is the preferred method of checking for firmware updates. The built-in firmware update mechanism checks for updates that match your specific product and hardware revision.

To check for new firmware:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Firmware Upgrade** link in the Configuration menu; the firmware upgrade page opens.
3. Click the check for updates link next to your current firmware version; the system connects to Epiphan servers to look for updates.
4. If an update is found a red box appears in the top left side of the web interface with a link to download and install the firmware.



5. Follow the steps below to download and install the firmware.

Install firmware

When you've received a new firmware file from Epiphan's support team, schedule a time where you can update the firmware without negatively impacting viewers or file recordings.



It is good practice to take a backup of your current configuration before applying a firmware update. In the rare case that you wish to downgrade the firmware, you will be able to apply this configuration backup and restore your previous state. See **Create a configuration preset**.

There are two ways to install new firmware: from a the download link via the web interface, or from a file provided by Epiphan.



Installing new firmware takes a few minutes. Broadcasting and recording is not available until the upgrade is complete.

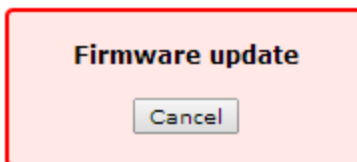
While the firmware update is applied, the touch screen displays a firmware update in-progress notice and no other interaction is possible.

Install firmware directly from the web interface:

If your Pearl has internet access, the easiest method of installing new firmware is to use the download link provided when you check for new firmware.

To download new firmware directly:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Save a copy of the current system configuration, if desired. See [Configuration presets](#).
3. Select the **Firmware Upgrade** link in the Configuration menu; the firmware upgrade page opens.
4. Click the check for updates link next to your current firmware version; the system connects to Epiphan servers to look for updates.
5. Click **download** from the red box that appears at the top left of the admin interface; the firmware is downloaded and immediately starts to install and the firmware update box changes to have a cancel button.

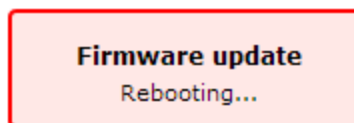


6. The touch screen, if enabled, also displays a notice that the firmware update is in progress.



Do not interrupt power to the system during the firmware upgrade.

7. When the firmware update is complete, the message lets you know it is going to reboot.



8. Wait for the system to restart. Depending on the upgrade, a disk rebuild may be required, causing the restart process to take much longer than usual.
9. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
10. Login as admin.
11. Select the **Firmware Upgrade** link in the Configuration menu; the firmware upgrade page opens.
12. Verify that the firmware version is the expected new version.

Although unexpected, it is possible the firmware update fails. In this case, the touch screen reports the failure. Please collect system information such as device serial number and, if known, the previous firmware version along with the new firmware version and contact info@epiphan.com



Install firmware from a file

Before getting started, ensure you have the firmware file accessible from your admin computer.

To install new firmware from a file:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Save a copy of the current system configuration, if desired. See [Configuration presets](#).
3. Select the **Firmware Upgrade** link in the Configuration menu; the firmware upgrade page opens.
4. Note the current firmware version listed.
5. Click the **Choose File** button next to Select firmware upgrade file; a file selection box opens.
6. Select the firmware upgrade file from your local computer.
7. Click **Apply**; the file is uploaded. The system unpacks and verifies the file. If the file is valid, the upgrade begins.
8. The touch screen, if enabled, also displays a notice that the firmware update is in progress.



Do not interrupt power to the system during the firmware upgrade.

9. Wait for the system to restart.
10. Connect to the admin interface using your preferred connection mechanism. See [Connect to the admin interface](#).
11. Login as admin.
12. Select the **Firmware Upgrade** link in the Configuration menu; the firmware upgrade page opens.
13. Verify that the firmware version is the expected new version.

Although unexpected, it is possible the firmware update fails. In this case, the touch screen reports the failure. Please collect system information such as device serial number and, if known, the previous firmware version along with the new firmware version and contact info@epiphan.com

Firmware Update Error



E-Mail: info@epiphan.com

Support

Epiphan provides a complimentary one-year support plan with your purchase (starting one year from the original product shipment date) as well as two extended support plans, SupportPlan and SupportPlan+. Both plans add two more years to extend the support to three years from original product shipment date.



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.

- [Download logs and "allinfo"](#)

Pearl also supports remote troubleshooting by Epiphan's support team. This service is only available to systems covered by SupportPlan+.

Remote support allows Epiphan to assist in troubleshooting issues you experience with the system and can also assist with resetting lost admin passwords. No private information is sent to the Epiphan maintenance server.

By default, all systems are setup with remote support configuration enabled.

This section describes procedures for the following topics:

- [Configure remote support](#)
- [Disable remote support](#)



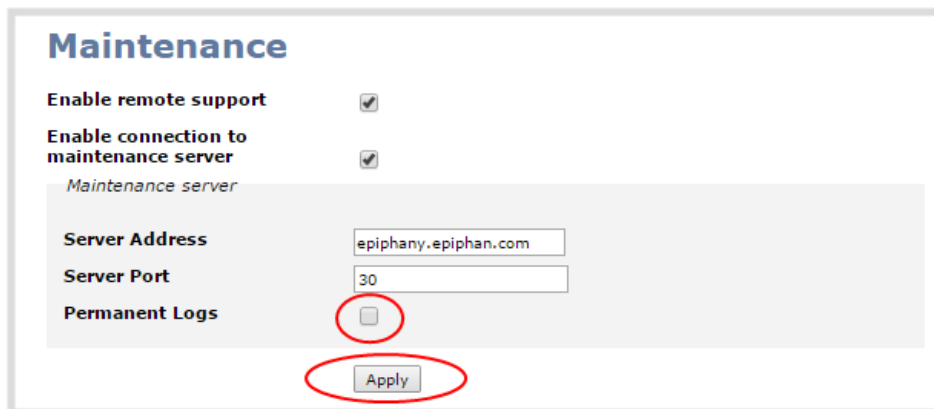
Remote support is only provided for systems covered by SupportPlan+. For more information about our service plans, see www.epiphan.com/supportplan.

Download logs and "allinfo"

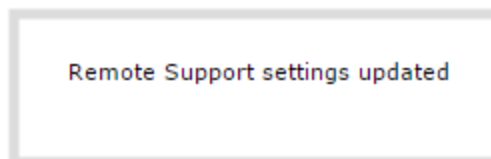
If requested by Epiphan support, you can download the logs files and/or "allinfo" data from your system. These files help our support team troubleshoot problems.

To download the logs and allinfo file:

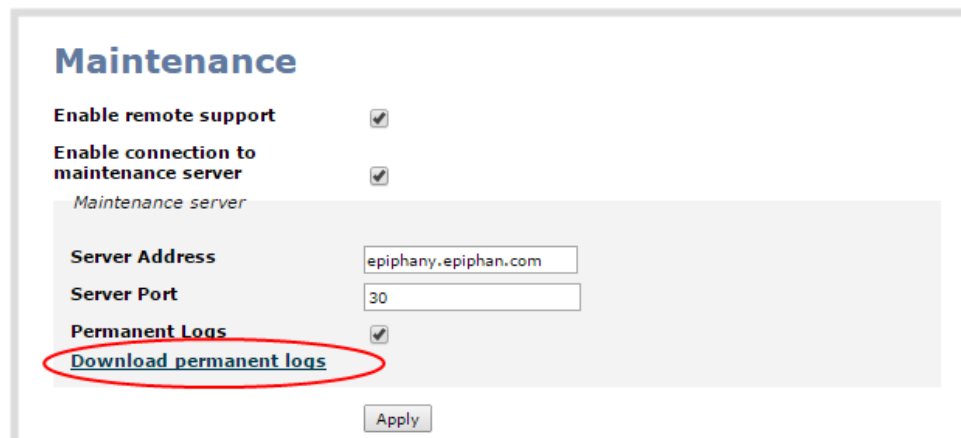
1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.



3. Select the **Permanent Logs** check box.
4. Click **Apply**; the page updates to let you know the changes were applied.



5. Select the **Maintenance** link again; the maintenance page opens.




6. Click **Download permanent logs**; a zip file containing system logs begins to download.
7. From your browser, run the allinfo script; a file is saved to your computer.

```
http://<ip address of your system>/admin/allinfo.cgi
```

8. Share the log files and allinfo results with Epiphan support.

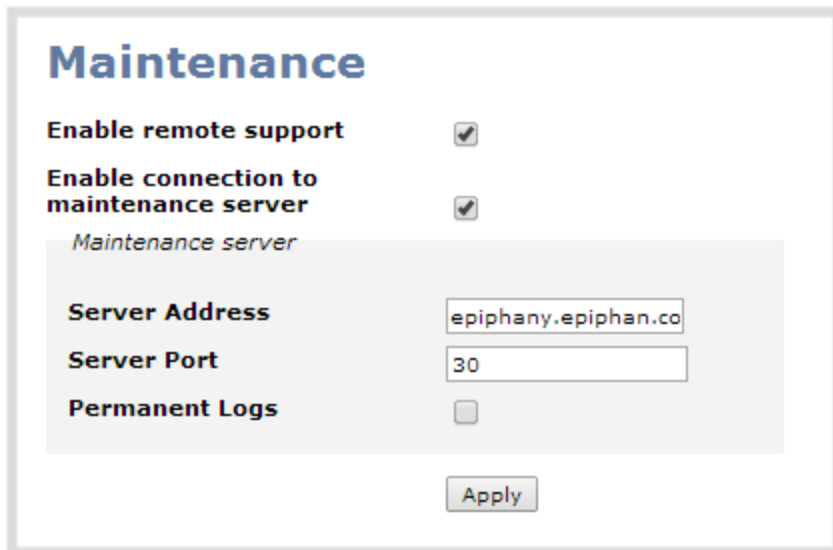
Configure remote support

Remote support is configured by default to connect to the Epiphan maintenance server with the domain name epiphany.epiphan.com. The system must be able to resolve this domain name to connect to the server and permit remote support. Remote support uses port 30, therefore this port must be available for communication. If your system is protected from the Internet by a firewall, speak to your network administrator to configure the firewall appropriately.

 Remote support is available from Epiphan only if your device is covered by SupportPlan+.

To configure remote support:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.



3. Click **Enable remote support** if the check box is not selected. This setting controls incoming links from Epiphan.
4. Click **Enable connection to maintenance server** if the check box is not selected. This setting configures outgoing links to Epiphan.
5. Ensure the **server address** is epiphany.epiphan.com, unless Epiphan support directs you to change it.

6. Ensure the **port** is 30, unless Epiphan support directs you to change it.
7. Click **Apply**.
8. Test that the system can access the maintenance server:
 - a. Select the **Network** link under Configuration.
 - b. Type epiphany.epiphan.com **Network Diagnostics** box.
 - c. Click **ping**.
 - d. Ensure the result shows an IP address for epiphany.epiphan.com and report any packet loss to Epiphan support.
9. If the system cannot reach the maintenance server, check the network settings (see [Configure DHCP](#)) to ensure DHCP is selected or a DNS server is listed and try again. Consult with your network administrator if problems persist.
10. If the system reaches the maintenance server, ensure your firewall, if you have one, has port 30 open for the system.
11. Confirm with Epiphan support that they are able to access your Pearl for remote troubleshooting.

Disable remote support

By default, remote support is on. If you want to turn it off, you may use the following procedure.



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

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Maintenance** link in the Configuration menu; the maintenance page opens.
3. Click **Enable remote support** check box to deselect it. This prevents incoming links from Epiphan.
4. Click **Enable connection to maintenance server** to deselect it. This prevents outgoing links to Epiphan.
5. Click **Apply**.

Storage disk maintenance


Your Pearl is equipped with a hard drive for storage of recordings. Occasionally, maintenance is required for these disks. This section describes procedures for the following topics:

- Check disk storage space
- Check disk storage space via the touch screen
- Schedule disk check
- Perform disk check

Check disk storage space

Pearl has a finite amount of storage. This storage space holds a lot of recordings, but it can get full. It's a good idea to monitor your current disk usage.

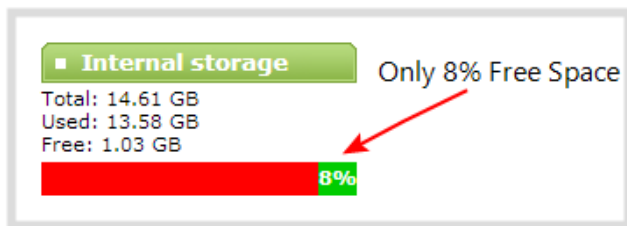
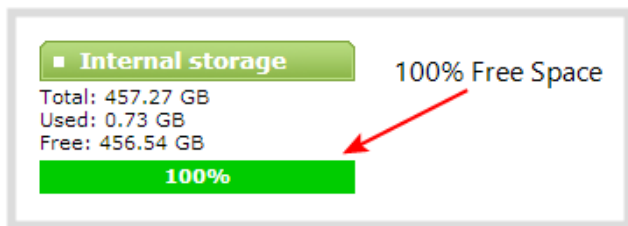
If available storage is low, consider removing some unneeded recordings or setting up an automatic file transfer with deletion after transfer. See [Recorded files](#) and [File and recording transfer](#).



Disk space can also be checked via the tablet interface. See **Verify disk space via the tablet interface**.

To check disk storage space:

1. Login to the admin interface as **admin** or **operator**. See [Connect to the admin interface](#).
2. Check the **Internal Storage** section at the bottom of the menu column. The bar will be mostly green if there is lots of space left, or mostly red if storage space is nearly full.



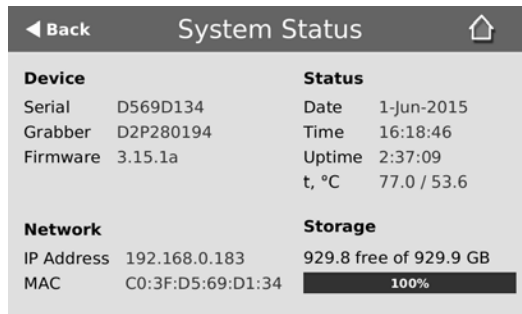
3. If available storage is low, take action to remove files as discussed in [Recorded files](#) and [File and recording transfer](#).

Check disk storage space via the touch screen

Pearl's touch screen can show you the system's disk space on the system information screen.

To show system information on the touch screen:

1. If the system information button does not appear on the screen, tap the screen once to turn on the control buttons.
2. If the system information button is still not visible, it is disabled in the system's touch screen configuration. See [Configure the touch screen](#) to enable system information.
3. Touch the system information button (**i**) on the screen



Device		Status	
Serial	D569D134	Date	1-Jun-2015
Grabber	D2P280194	Time	16:18:46
Firmware	3.15.1a	Uptime	2:37:09
		t, °C	77.0 / 53.6
Network		Storage	
IP Address	192.168.0.183	929.8 free of 929.9 GB	
MAC	C0:3F:D5:69:D1:34	100%	

To close the system information screen:

1. Touch anywhere on the screen to return to the previous screen.

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, 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 interface as **admin**. See [Connect to the admin interface](#).

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 interface as **admin**. See [Connect to the admin interface](#).
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.

← → ↻ 192.168.1.164/admin/fsck.cgi

Disk check in progress

DO NOT navigate away from this page, interrupt or power down until the disk check is completed.

```
Started disk check id 31500 on Mon Feb 3 15:52:20 EST 2014
e2fsck 1.41.4 (27-Jan-2009)
Pass 1: Checking inodes, blocks, and sizes
|-----| 96.0%
```

4. When the disk check is complete, the main page returns and a summary is shown.
5. If any unrecoverable errors are detected, contact Epiphan support.

Third party integration

Pearl 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. For example you can start and stop recordings, you can configure meta data on a channel, or even change a channel's frame size and encoding settings.

The following topics are covered in this section:

- [Control with RS-232 / serial port](#)
- [Control with HTTP commands](#)
- [Configuration keys for third party APIs](#)

Control with RS-232 / serial port

Pearl presents an RS-232 / serial port control interface (via USB) for integration with existing control room and board room equipment. This section covers the following topics:

- [Connect and configure the RS-232 cable](#)
- [Control Pearl with RS-232](#)
- [RS-232 / Serial port command examples](#)

Connect and configure the RS-232 cable

To connect your control equipment to Pearl you will need a standard RS-232 null-modem cable and a USB to RS-232 serial adapter cable. Adapter cables are not included with Pearl. Only certain adapter chipsets are supported, Epiphan recommends this [adapter cable](#) from Startech.

To connect the serial port cable:

1. Attach the null modem cable to the control interface.
2. Connect the USB to RS-232 serial adapter to the null-modem cable.
3. Connect the USB to RS-232 serial adapter to one of the system’s USB ports.

The only configuration available for the serial port is flow control. Flow control changes the rate of data transfer over the cable. Some communication settings are static and cannot be changed. The static settings are:

- Baud rate set at 19200
- Parity set to none
- Stop bits set to one

To configure serial port flow control:

1. Login to the admin interface as **admin**. See [Connect to the admin interface](#).
2. Select the **Serial Port** link in the Configuration menu; the serial port configuration page opens.
3. Select **Hardware**, **Software**, or **None** from the drop-down menu. Refer to the table below for a description of the options.

Table 44 Serial Port Flow Control Options


Label	Description / Options
Hardware	A hardware handshake mechanism is used for flow control. This is also called RTS / CTS flow control. Select this when your control terminal requires it (see control terminal manual).

Label	Description / Options
Software	A software handshake that uses XON/XOFF characters to control the flow of data. Select this when your control terminal requires it (see control terminal manual).
None	No flow control is used. Only select this if your control terminal requires it (see control terminal manual).

4. Click **Apply**.

Control Pearl with RS-232

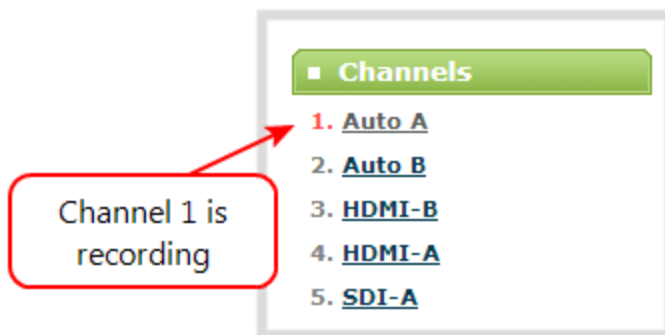
You can use the null-modem cable and your control terminal software to issue commands to Pearl such as when to start or stop recording, or to retrieve or set the value for various settings.



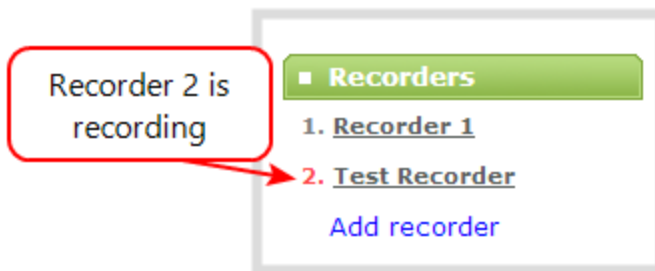
Each command sent to Pearl via RS 232 must be terminated with a line feed (LF) character (ASCII code 10). Your software may need to be configured to add the line feed to each command.

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, as shown in the table. 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 is found by looking at the Channels list in the web interface. In the screen capture below, the channel with index 1 is currently recording (it's index number is red). To address this channel via RS-232 commands, use the index 1.




For commands requiring a recorder index, determine your recorder's index by combining the recorder's number with the prefix m. In the example below, the second recorder's index is 2. To access this recorder via RS-232 commands, use the index m2.



The table describes the RS-232 commands supported by Pearl.

Table 45 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> START.<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 system.

Command Name	Description
Configuration Commands (see Configuration keys for third party APIs for available keys)	
GET.<channel>.<key> GET.<recorder>.<key>	Gets the saved value of a given parameter for the specified channel or recorder.
SET.<channel>.<key> SET.<recorder>.<key>	Sets the value of a given parameter for the specified channel or recorder. The value is not saved until the SAVECFG command is sent.
SAVECFG	Saves the parameters modified by the SET command.
Status Commands	
STATUS.<channel> STATUS.<recorder>	Reports the recording status of the specified channel or recorder. Status is one of: <ul style="list-style-type: none"> • RUNNING • STOPPED • UNINITIALIZED
STATUS	Reports the recording status of each channel and recorder. Status is one of: <ul style="list-style-type: none"> • RUNNING • STOPPED • UNINITIALIZED
FREESPACE	Reports the free storage space, in bytes.
RECTIME.<channel> RECTIME.<recorder>	Reports the elapsed recording time for the current file on the specified channel or recorder.
RECTIME	Reports the elapsed recording time for the current file on each channel.

Additionally, the system automatically reports its status changes back along the RS-232 connection using the following automatic messages:


Table 46 RS-232 Status Changed Messages

Command Name	Description
STATUS.<channel> <status>	Provides the status of the recording service for the channel's as one of: <ul style="list-style-type: none"> • Running


Command Name	Description
	<ul style="list-style-type: none"> • Stopped • Uninitialized <p>The Uninitialized status is sent when there is an internal error. Check the system for more details.</p>

RS-232 / Serial port command examples

The following examples demonstrate how to use some of the RS-232 commands supported by the system. The list of supported SET and GET parameters are found in [Configuration keys for third party APIs](#).

 Each command sent to Pearl via RS 232 must be terminated with a line feed (LF) character (ASCII code 10). Your software may need to be configured to add 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 "SET" examples below.

1. To start recording on channel 2:

```
START.2
```

2. To stop recording on channel 2:

```
STOP.2
```

3. To start recording on all channels and recorders:

```
START
```

4. To get the value of the frame size (resolution) for channel 2:

```
GET.2.framesize
```

5. 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
```

6. To enable broadcasting audio on channel 2:

```
SET.2.audio=on  
SAVECFG
```

7. To disable broadcasting audio on channel 2:

```
SET.2.audio=""  
SAVECFG
```

Control with HTTP commands

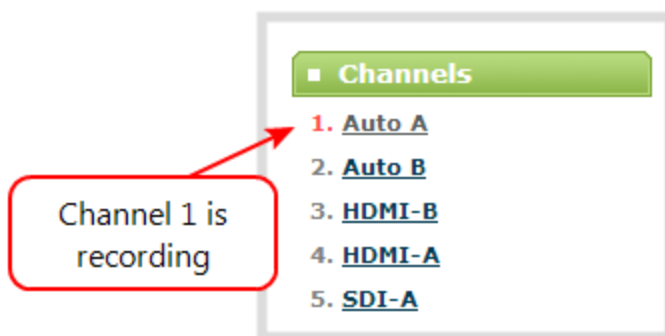
Pearl has an HTTP API interface for configuration and control by a third party application or with a script that sends commands to the system as a series of URLs. This section covers the following topics:

- [HTTP command syntax](#)
- [HTTP command examples](#)

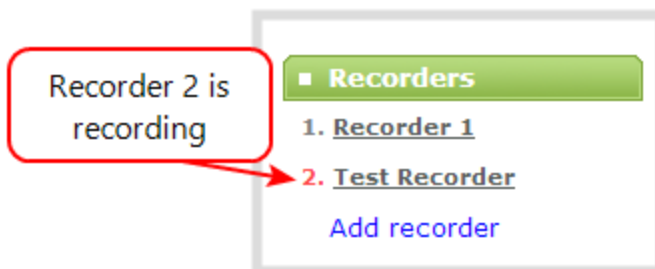
HTTP command syntax

Control of Pearl by HTTP is done by sending commands to one of two URLs and specifying the target configuration item. Syntax for the get and set commands follows.

Many commands require a *channel* or *recorder* index as an argument. A channel's index is found by looking at the Channels list in the web interface. In the screen capture below, the channel with index 1 is currently recording (it's index number is red). To address this channel via http commands, use the index channel1.



For commands requiring a recorder index, determine your recorder's index by combining the recorder's number with the prefix *channelm*. In the example below, the second recorder's index is 2. To access this recorder via http commands, use the index channelm2.



To Get configuration settings:

```
http://<address>/admin/channel<N>/get_params.cgi?key
```

(or 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
```

(or 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 system, channel<N> is the channel number (i.e. channel2 for channel number two), channelm2 for recorder two, key is the key for the configuration item being checked or changed (see the list in [Configuration keys for third party APIs](#)), and value is the value to set for the configuration item.

Multiple requests at once

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. To send a request for both the product name and the firmware version, use the following command:

```
http://<address>/admin/channel1/get_params.cgi?product_name&firmware_version
```

Or, to turnoff publishing (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 the system, always include the admin username and password when viewing or setting configuration items.

The syntax for wget commands is shown below. Specify your system's IP address, password and the key(s) or value(s) you wish to query. Note 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>]
```

HTTP command examples

Some configuration of Pearl can be done by non-interactive http commands. The following examples demonstrate how to use wget to exercise some of the HTTP commands supported by the system.



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 pass123.

1. 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
```

2. 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
```

3. 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
```

4. 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=""
```

5. 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
```

Configuration keys for third party APIs

Using HTTP or RS-232, you can send commands to the system to query or configure the system. For the RS-232 and HTTP syntax see [Control with RS-232 / serial port](#) and [Control with 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 as %20: set_params.cgi?framesize=640%20x%20480

The following sections describe the API keys supported by the system in each of these categories:

- [System-level settings keys \(read-only\)](#)
- [System-level settings 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](#)
- [Frame grabber 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)
- RTSP Announce configuration keys (Publish type 2)
- RTSP Announce configuration keys (Publish type 2)
- Content metadata configuration keys

The list of supported keys is also available for viewing from your system. Browse to the following URL (where <address> is the IP address of the system):

```
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 47 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 48 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.

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 49 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 empty string ("")	Enables or disables system information from the touch 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.

Key	Values	Description
		To disable settings changes from the touch screen, set to an empty string ("").
touchscreen_timeout	integer	Specify the time in seconds before the touchscreen times out. For no timeout, use 0.

Recording configuration keys

The following recording settings are supported. When using,, specify the channel or recorder you wish to configure.

Table 50 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)
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 the system.

Table 51 Supported HTTP Server configuration keys

Key	Values	Description
http_port	integer	Specifies the HTTP server port.

Key	Values	Description
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 the system ONLY, not for individual channels. See [Restrict viewers by IP address](#) for more information on Allow and Deny lists.

Table 52 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-separated list of IP addresses and/or ranges. empty string ("")	Specifies the IP addresses to deny access. 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 53 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

Key	Values	Description
		("").
server_name	string	Specifies the UPnP server name. To use the system name, set to an empty string ("").

Frame grabber configuration keys

These configuration keys are not supported for use with Pearl. Please perform tweaks to the frame grabber using the web admin interface. See [Configure a source](#).

Key	Values	Description
gain	0...255	Specifies ADC gain adjustments. 0 is brightest, 255 is darkest.
hshift	-999...999	Specifies horizontal shift. For shifts to the left, use positive values. For shifts to the right, use negative values.
offset	0...63	Specifies ADC offset. 0 is brightest, 63 is darkest.
phase	0...31	Specifies phase adjustments for VGA signals. Generally not used unless value is provided by Epiphan support.
pll	-999...999	Specifies PLL adjustment. Changes the number of pixels in the line.
tune_interval	0...9999	Specifies the number of seconds between auto-adjustments. To disable auto-adjustments, set to 0.
vshift	-20...20	Specifies vertical shift. For shifts up, use positive values. For shifts down, use negative values.

Broadcast configuration keys

The following settings for streaming to viewers (broadcasting) are supported, including stream access control settings.

Table 54 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.
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 55 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 mpeg4 mjpeg	Specifies the stream codec.
fpslimit	1-60	Specifies the frame per second limit.

Key	Values	Description
		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 resolution supported by Pearl
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 kbit/s.
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

The following settings are channel layout configuration.

To work with layouts, you need to know the integer identifier for the layout. To find your layout's identifier, select the layout from the web UI and look for the identifier in the browser's url bar.

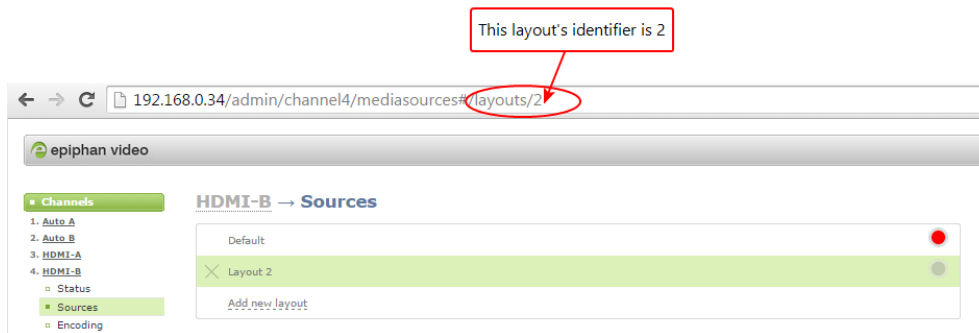


Table 56 Supported channel layout configuration keys

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 Encoding \(Multi-source\)](#).

Table 57 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_s16le (PCM) libmp3lame (MP3)	Specifies an audio code preset in the format CODEC;RATE. i.e. libfaac;22050

Key	Values	Description
	libfacc (AAC) RATES: 16000 (AAC only) 22050 44100 48000	

Stream publishing configuration keys

The system supports the following stream publishing settings. For more information on publishing the stream, see [What is streaming?](#).

Table 58 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 Epiphan.tv, 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) 1 (via Epiphan.tv) 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, see [To stream content to a CDN using RTSP announce](#) [What is streaming?](#).

Table 59 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. Use udp or "" for udp transport Use tcp for tcp transport.
rtmp_username	string	Specifies the username for the RTSP server.
rtmp_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 60 Supported RTP/UDP configuration keys

Key	Values	Description
unicast_address	string (IP address)	Specifies the unicast/multicast address.
unicast_apt	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 61 Supported MPEG-TS and SAP configuration keys

Key	Values	Description
unicast_address	string (IP address)	Specifies the unicast/multicast address.
unicast_mport	1000...65535, but not 5557	Specifies the UDP port for MPEG-TS streaming. Note port 5557 is used for network discovery and cannot be used for streaming.
sap	on empty string ("")	Enables sharing of recorded files via SAP. To enable sharing files over SAP, set to on. To disable sharing files over SAP, set to an empty string ("").
sap_channel_no	integer	Specifies the SAP channel number.
sap_group	string	Specifies the SAP group name.
sap_ip	string	Specify the SAP announcement 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 [To stream content to a CDN using RTMP push](#) and [What is streaming?](#).

Table 62 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 63 Supported Livestream configuration Keys

Key	Values	Description
livestream_channel	string	The channel name, configured at the Livestream server.

Key	Values	Description
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 64 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

Use the follow table for help if you are experiencing problems or unexpected behavior from your Pearl.

Problem	Action(s) to Resolve
<p>Not sure if the connected video inputs are being captured.</p>	<p>Check each source's input from the source preview in the Web Interface.</p> <p>OR</p> <p>Check the touchscreen interface to view confidence monitoring for each channel. See Touchscreen overview.</p>
<p>No sound is coming from an audio source.</p>	<p>Verify that you are using the correct audio input by following the steps in Configure encoding.</p> <p>OR</p> <p>Check the audio meter from the tablet UI (accessible from any web browser). See Mobile / tablet operator interface.</p> <p>OR</p> <p>Check the touchscreen interface for audio monitoring or use the 3.5 mm audio jack on the front of Pearl to verify audio. See Touchscreen overview.</p>
<p>Too much noise is present in the audio output.</p>	<p>Modify the Input Amplifier Volume parameter in the Audio menu. Start with setting it to 40% and reduce until the noise is no longer present. See for details on this setting.</p>
<p>Image quality is poor or insufficient.</p>	<p>The following tips can help improve image quality:</p> <ol style="list-style-type: none"> 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.
<p>Frames per second are lower than expected.</p>	<p>The following tips can help improve frames per second (fps):</p> <ol style="list-style-type: none"> 1. Increase the Limit frame rate value and/or decrease the Bitrate value in the Encoding menu. See Configure

Problem	Action(s) to Resolve
	<p>encoding .</p> <ol style="list-style-type: none"> 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.
<p>Stream won't play in my media player or browser.</p>	<p>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.</p> <p>If you still cannot see the stream, try disabling your local computer firewall.</p> <p>If the issue is still not resolved, contact Epiphan Support at support@epiphan.com.</p>
<p>The stream interrupts or the image breaks up.</p>	<p>The following tips can help diagnose image problems:</p> <ol style="list-style-type: none"> 1. Ensure the source resolution is used as the output or recorded resolution. Up-scaling and down-scaling can affect picture quality. 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.
<p>Recording issues.</p>	<p>If recording will not start, check the Disk Status Information to see if the system is out of disk space. See Check disk storage space and Recorded files.</p>
<p>Firmware upgrade fails.</p>	<p>Reboot the system and try again. If the problem persists, contact Epiphan support at support@epiphan.com.</p>

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.

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.

Important notes about upgrading to firmware 3.16.0

1. Note that configuration presets replace the concept of backup files and use a new file format to accommodate portability between systems. As a result, backup files from previous versions cannot be loaded on firmware 3.16.0. Further, all existing configuration presets are deleted during the firmware upgrade. Be sure to keep notes for any configuration presets you wish to recreate.
2. As of release 3.16.0, streaming can be enabled and disabled independently from streaming credential configuration. Streaming defaults to enabled (started) until set to disabled.

Affecting encoding

- **Limitation:** When Pearl is overloaded, video frames or audio samples can be dropped causing variable frame rate and audio cracks.
Workaround: Pearl 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'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 web UI can increase overhead, as can switching layouts via Pearl's touch screen.
- **Limitation:** When audio is enabled on an SDI source where video is already being captured, it takes up to 15 seconds for the system to detect the audio. Once detected, the audio is properly synchronized with the video.
Workaround: Start the SDI signal with audio enabled, or check to ensure audio is detected before streaming or recording.
- Encoding with MPEG-4 sometimes results in poor quality.
Workaround: From the channel's stream setup, increase the video bitrate to improve picture quality.
- Video bitrate for MJPEG streams is larger than the configured value.
Workaround: Verify the actual bitrate on the channel's channel status page when there are connected viewers. If lower bitrates are important, select another codec.
- For VGA sources only, some wide-mode resolutions are not correctly identified and result in a slightly squished image (e.g. for a 1360x768 source, the detected resolution may be 1024x768).
Workaround: This issue is related to the video source. Test your source to see if it exhibits the issue. If possible, avoid using wide-mode for VGA sources that exhibit this issue.
- Some cameras are sensitive to EDIDs and are not captured at optimal settings. When capturing from these cameras, the HD signal may be down-sampled by the camera to an SD signal because the Epiphan system doesn't share the EDID the camera expects for its HD signal.
Workaround: Contact Epiphan customer support for a custom EDID to resolve this issue.

- Encoding video at 60 fps with either 16 MHz or 22 MHz AAC audio can result in some dropped video frames.
Workaround: Select another video frame rate, a different audio sampling rate, or choose MP3 audio.
- The automatically calculated frame size for HD VGA sources is occasionally incorrect.
Workaround: This problem is caused due to cable degradation or poor cable connection. Re-seat or exchange your VGA cable. If the problem is still not resolved, visit the Epiphan Pearl support page for a custom EDID to resolve the issue.

Affecting streaming and recording

- When switching layouts while streaming or recording it's possible to have a small number of frames (approximately 100ms worth) repeated in the stream or recording file, and over the same time period a small number of frames from the new layout skipped.
Workaround: If dropped frames are problematic for your application, avoid the layout switching feature.
- CPU is under high load when rotating a source through the sources configuration menu.
Workaround: If possible, manually or programatically rotate the source image (e.g. rotate the camera or use the source's software settings) instead of rotating via the streaming system's configuration pages.
- Streaming status on the touch screen does not include Wowza Streaming Cloud transcoder settings.
Workaround: Start the transcoder from the Pearl or Wowza web UI.

Affecting the web interface

- Navigating the web admin interface in a Chrome browser sometimes asks the user to save changes when no changes were made.
Workaround: If confident nothing was changed, simply ignore the message by clicking OK/Leave This Page. If unsure, select Cancel/Stay On This Page and save the page's settings before navigating away to a new page.
- 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 transferred, even though they are not listed.
Workaround: Wait for the queue to have fewer files in the list.

Affecting video output ports

- Sometimes, short audio clicks are heard on the video output port and through the confidence monitoring headphones, particularly during switching. These audio distortions are only present in the output port and through the confidence monitoring headphones, all resulting recordings or streams are unaffected.
- 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.
- When changing encoding parameters for a channel that is displayed via the video output port, the video output port may revert to the display's default resolution if the output resolution is set to "Same as source".
Workaround: To resolve, change the video output port to a different resolution then back to "Same as source".

- Some monitors, when attached to one of the video output ports, prevent the system fails to boot back properly after a software initiated reboot. (This was observed with a Samsung 4k monitor.)
Workaround: If you observe this problem, use the hardware button for shutdown and startup or disconnect the monitor during reboots.

Affecting other areas

- Pearl fails to restart after improper shutdown (power cable removed or rapid power cycle). LED and touch screen blink.
Workaround: Restart Pearl by removing the power cable for 20 seconds, then reattaching the cable and powering the system back on.
- Due to changes in the way channel layouts are created, some HTTP and RS-232 remote layout commands are no longer available 3.15.3. These include values for setting the text overlay, logo, logo positioning, keep aspect ratio and no signal image.
Workaround: Update your scripts to avoid using these commands. See the manual for a full list of available commands.
- HTTP commands sent in quick succession are occasionally not properly executed, and may report incorrectly that they were executed.
Workaround: For best results, add 1 second sleep or delay between HTTP commands.
- On Windows 10, the Movies & TV app fails to playback AVI files using AAC or MP3 audio and fails to playback MP4 files with PCM or MP3 audio.
Workaround: If possible, use another video playback application. If you require playback by the Movies & TV app, set your recording settings to use PCM audio if creating AVI files or to AAC audio if creating MP4 file recordings.

Previous releases and features

This section outlines the features introduced with previous product release.

Release 3.15.3 features

- Configuration improvements
- Enhanced user control

Release 3.15.2 features

- Layout items can now be reordered
- Finer layout item position control
- Video switching via RS-232 and HTTP APIs

Release 3.15.1 features

Firmware release 3.15.1 was a big release with a lot of new features for Pearl, making it your perfect, go-to favorite when recording or streaming live video events.

- Front-mounted audio jack for Pearl
- Live video switching
- Audio monitoring on Pearl
- Video source cropping
- Use a picture as a video source
- Transparent PNG overlays
- Stream background, logo and text overlay improvements
- New multi-source layout designer

Release 3.14.4 features

- Live Streaming via Wowza Cloud

Release 3.14.3 features

- Configuration presets
- Network configuration via the touch screen
- Stereo audio encoding
- Support for 256 kbps and 320 kbps audio sampling

- LDAP support
- SCP and SFTP file transfer

Release 3.14.1 features

- Capture 4 HD sources simultaneously
- 48 kHz audio support
- Simplified H.264 video encoding presets
- Configurable EDID
- MP4 support

Release 3.14.0 features

- Touch screen display
- HDMI input
- Automatic channels
- Hardware acceleration for H.264 encoding
- Stream access control improvements

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March 28, 2014

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2. This device must accept any interference received, including interference that may cause undesired operation.

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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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