

Epiphan Pearl Nano



Release 4.24.2

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UG128-03

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

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

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

Table of contents

Thank you for choosing Epiphan!	ii
Start here	1
Release notes	2
Product overview	9
Pearl Nano overview	9
Front and back view of Pearl Nano	11
Monitoring audio	13
About 4K on Pearl Nano	15
Pearl Nano AV inputs	16
Pearl Nano Tech specs	17
Pearl Nano Power adapter specifications	25
Optimum System Load	26
International character support	27
Quick start	28
Next Steps	29
Pearl Nano sample recording	30
Setup	32
Access network IP address and Admin panel	32
Vesa mounting the device	34
User interfaces and remote access	34
Pearl Nano's front panel control interface	35
About the front screen and control key interface	35
The front screen Channel view	38
The front screen menu and control keys	39
Record and stream using the control keys	41
Dim the front screen and control interface	42
Set the Pearl device screen timeout	43
Set a PIN security code	43
One Touch streaming and recording control	44
The Admin panel	48
About the Admin panel	48
Connect to the Admin panel	51
Enable local console access to the Admin panel	52
Connect using a DNS-based service discovery	55
Connect using persistent static IP address	56

Cloud-based device management	57
About Epiphan Edge	58
Enable or disable Epiphan Edge access	59
Pair and unpair from Epiphan Edge	60
Remote login to the Admin panel and Epiphan Live	62
Schedule start and stop times to record and stream	64
Configure network settings	66
Network ports used by Pearl Nano	66
Verify IP address and MAC address	68
Configure a static IP address	69
Configure DHCP	73
Configure DHCP Option 81	75
Configure Dynamic DNS	76
Change the HTTP/HTTPS port values	78
Perform network diagnostics	79
Disable the network discovery port	81
Configure network security	81
Configure 802.1x network security and manage user certificates	82
Manage CA and self-signed certificates	83
Configure HTTPS	84
Configure HTTP Keep Alive Settings	86
Configure system settings	87
Configure date and time	88
View the current date and time settings	88
Configure a time server	89
Manually set the date, time, and time zone	90
Configure device info, name, description, and location	91
SD card and SATA M.2 2280 SSD storage	92
Install and format an SD card for the Pearl Nano	93
Install and format a SATA M.2 2280 SSD for Pearl Nano	95
Audio input ports	97
Selecting an audio source	98
Connecting microphones to the XLR line level inputs	101
Configure audio ports for stereo or mono	101
Assign audio sources to an input	103
Adjust audio gain and delay	105
Mute audio	109
Video output ports	111
About video output ports	112

Video output port resolution	114
Set up the video output port using the Admin panel	114
Set up and enable MultiViewer	117
MultiViewer system information	120
Select the video output source using the device screen	121
Preview the video output port	122
Disable the video output port	123
Disable or enable audio and output port volume	123
Display and reposition the audio VU meter	125
Rename a video output port	126
Mirror the video output port display	127
Connect external devices	128
Connect an external keyboard	129
Connect a USB status light	130
Connect a USB control button to control CMS events	132
Feature add-ons	136
Add-ons overview	136
About 4K on Pearl Nano	138
User administration	139
User types and privileges	140
Change user passwords	144
Overcome lost passwords	146
Remove user password	146
Log in using a different user account	147
Assign administrator privileges to operators	147
Configure LDAP user authentication	149
Restrict viewers by IP address	151
Configuration presets	156
About configuration presets	156
Configuration preset considerations	158
Configuration preset considerations	159
Recording and streaming states	160
Recorded files in a channel or recorder	160
Configuration groups	161
The Factory default configuration preset and Factory reset	162
Create a configuration preset	163
Apply a configuration preset using the Admin panel	164
Apply a configuration preset using the front screen menu	165
Export and import configuration presets	167

Update a configuration preset	169
Delete a configuration preset	169
Status and monitoring	169
Monitoring audio and VU sensitivity	170
Confidence monitoring using the front screen	171
View system status using the front screen menu	173
View system information using the Admin panel	175
View network status	175
View 802.1x network connection status	175
View channel status and stream information	176
View the video output port status	177
View AFU and file transfer progress	178
View scheduled CMS events and history	181
Capture	184
What is a channel?	185
Channel layout examples	185
About automatic channels	188
Channel configuration	190
Configure an auto channel	190
Add video sources	191
Add an audio source to a layout	195
Rename a channel	196
Preview a channel	198
Add or remove channel metadata	199
Configure encoding	200
Codecs and file format compatibility	200
Configure video encoding	202
Configure audio encoding	207
Custom layout configuration	209
About the custom layout editor	209
Resize and position items using percents or pixels	212
Open the custom layout editor for a channel	218
Configure a custom layout for a channel	218
Rename a layout	220
Set the background color	220
Add an image to a layout	221
Upload or remove an image using the Media page	223
Add a text overlay	224

Custom system variables for text overlays	227
Crop a video source	229
Video and audio input sources	231
About connecting video and audio sources	231
Tested RTSP-based IP cameras	233
Connect an RTSP source	234
Connect an SRT stream as an input	236
Preview a video source using the Admin Panel	239
Rename an input port	239
Configure a video input source	239
Add a custom No Signal image	241
Stream	243
What is streaming?	244
Streaming to a CDN, multicasting, and streaming to multiple destinations	245
Directly sharing channel stream URLs with viewers	247
About streaming using SRT	248
Secure streaming	250
Suggested stream settings	251
Streaming a channel direct to viewers	253
Share a live broadcast stream (HTTP, HTTPS, or RTSP)	254
Enable HLS (pull)	255
Restrict viewer access to channel streams	257
Restrict viewers by IP address	258
Change HTTP and RTSP streaming port values	262
Disable and enable direct channel streaming	263
Viewing a channel's live broadcast stream	264
View the live broadcast URL using a web browser	266
View the streaming URL using a media player	267
Streaming to servers, CDNs, and other devices	269
Set up an RTMP or RTMPS (push) stream	269
Set up an SRT stream using rendezvous mode	270
Set up an SRT stream using caller and listener modes	274
Adjust latency and view the SRT stream status	277
Set AES encryption and a passphrase for SRT	281
Set up an HLS (push) stream	282
Set up an RTSP announce stream	283
Set up a stream to the CDN using an XML profile	285
Start and stop streaming to a CDN	286

Multicast streaming	288
MPEG-TS streams using RTP/UDP push	288
MPEG-TS streams using UDP push	291
Multicast streaming using RTP/UDP	292
Set up traffic shaping	293
Viewing with Session Announcement Protocol (SAP)	295
Streaming to a media player or smart TV	297
Record	298
About recording	298
Pearl Mini and Pearl Nano recording storage information	300
Record a channel	301
Configure recording settings, file size, and type	303
Restart recording to a new file	305
Manage recorded files	307
Join recorded files together	308
Automatic file transfers	310
About Automatic File Upload (AFU)	310
Set channels and recorders to include in AFU	312
Enable AFU, schedule, and set options	312
Configure AFU to Epiphan Edge	314
Configure AFU to FTP server parameters	314
Configure AFU to SFTP server parameters	316
Configure AFU to RSync server parameters	318
Configure AFU to CIFS server parameters	320
Configure AFU to SCP client parameters	321
Configure AFU to AWS S3 parameters	323
Configure AFU to WebDav server parameters	325
AFU or copy to USB	327
Automatic File Upload to a USB storage device	335
Manually copy recordings to USB	336
One-time copy all recordings to USB storage device	339
Manually copy recordings to USB	341
Manage USB file transfer queue	345
Manage USB drive	347
Add recordings to an AFU queue	348
View the AFU log	349
Manage the AFU queue	349

Integration	350
Kaltura registration	350
Enable CMS and register with Kaltura	351
Disable or deregister from Kaltura	354
Change the resource name used for Kaltura	355
Reassign a registered resource	355
Kaltura recording and webcasting setup	357
About Kaltura recording and webcasting	358
Kaltura settings	360
Set up channel for Kaltura VOD events on Pearl Nano	362
Set up channel and URLs for Kaltura webcasting events	363
Set Kaltura ad hoc event parameters	364
Set the extend Kaltura CMS event interval	366
Change the events schedule refresh interval	367
Use RTMPS for a Kaltura webcasting event	367
Panopto registration	368
Enable CMS and register with Panopto	368
Disable CMS and disconnect from Panopto	369
Panopto recording and webcasting setup	370
About Panopto recording and webcasting	371
Enable Schedule Opt-in for scheduled Panopto events	374
Set up Panopto authentication for ad hoc events	375
Set Panopto ad hoc event parameters	378
Set the extend Panopto CMS event interval	379
Enable mute and display image on pause	381
Disable low disk space Panopto alerts	383
YuJa setup	386
YuJa known issues	386
YuJa registration	387
YuJa settings	389
Creating, modifying, and deleting YuJa events	390
Accessing YuJa recordings	390
Set the extend YuJa CMS event interval	391
View YuJa events	391
Opencast registration	392
Enable CMS and register with Opencast	392
Disable CMS and disconnect from Opencast	393
Opencast recording and streaming setup	394

About Opencast recording and streaming	394
Set the extend Opencast CMS event interval	396
Enable Schedule Opt-in for Opencast events	397
Set Opencast ad hoc event parameters	397
CMS recording and webcasting control	398
Set up a CMS start screen	399
Start/stop scheduled CMS events using the Admin panel	400
Stop/start scheduled CMS events using Pearl Nano's front screen menu	402
Extend or pause CMS recordings and webcasts	403
Create ad hoc events using the Admin panel	408
Log out of an ad hoc session	411
Schedule when CMS event recordings upload	412
Upload the local Panopto webcast recording	413
Recover channel backup recordings	414
 Maintenance	 417
Power down and system restart	417
Back up your Pearl device setup	419
Perform a factory reset	420
Firmware upgrade	421
Register your device	426
Support	427
Storage capacity and maintenance	430
 Troubleshooting	 434
Diagnostic tools	434
Connectivity status results	435
Run diagnostic tests using the Admin panel	437
Run diagnostic tests using the device screen	438
Troubleshooting Quick Reference	440
Remove black bars (matte) from the video	444
Use a specific EDID for the video input port	447
 External keyboard shortcuts	 450
 Limitations and known issues	 452
Software license	456
 Thank you for choosing Epiphan!	 465

Start here

Welcome, and thank you for buying an Epiphan Pearl device.

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

- For a product description of the Pearl Nano, see [Pearl Nano overview](#).

Pearl Nano is fully integrated with Kaltura, Panopto, and Yuja Content Management Systems (CMSs) and is easily setup using the Admin panel. The Integration section of this guide details how to register and set up the Pearl device as a remote recording and streaming device with these CMSs.

The Pearl Nano can use the REST API with third-party applications. See: [Pearl System REST API Guide](#).

The Pearl Nano can use the Legacy RS-232 API or Legacy HTTP API with third-party applications. See: [Pearl System Legacy RS-232/HTTP API Guide](#).

About this Guide

After the introductory section, the next section describes the setup and main user interfaces that are used to operate and configure the Pearl device. You'll find everything that you need to use and set up these interfaces :

- Front screen menu and control button interface for Pearl Nano
- Admin Panel

The rest of the user guide covers setting up and operating your Pearl system for a successful experience. The sections are organized into these main categories: [Setup](#), [Capture](#), [Stream](#), [Record](#), [Integration](#), [Maintenance](#), and [Troubleshooting](#).



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

Release notes

Release 4.24.3

Kaltura Transcoding Profiles

You can now choose which quality versions your recordings are transcoded into when uploading to Kaltura. This gives you more control over storage usage and can speed up video availability by reducing processing time.

Opencast Interoperability Enhancements

Our Opencast Capture Agent is now aligned with the latest interoperability guidelines, ensuring smoother integration and enhanced security through updated permission requirements.

Bug Fixes

Fixed an issue that could degrade encoding quality on Pearl Nano.

Fixed a bug that caused Ethernet CRC errors, which could lead to dropped Ethernet frames.

Resolved an issue where pausing a CMS event without resuming before the event ended failed to remove the paused duration from the final recording.

Previous releases and features

This section lists features and updates introduced in previous product releases.

Release 4.24.2

Opencast scheduled live webcast support:

Epiphan Pearl capture agents now support scheduled live webcasts via Opencast. With this enhancement, your Pearl system can be configured to automatically start streaming to one or more predefined destinations.

Improved RTMP stability for Pearl Nano:

Introduced a new configuration option on Pearl Nano to minimize high bitrate variability. This helps prevent potential stream disconnections with certain RTMP endpoints.

Accurate MTU settings on Pearl Nano:

Fixed an issue where the MTU value set through the Pearl Nano web interface was not being applied. This update ensures your network configurations are now correctly honored.

Updated Built-in CA Certificates:

This update includes refreshed digital certificates used to secure communication between Pearl systems and external services.

Audio codec validation:

We've added validation for audio codec settings in the web interface to help prevent configuration errors and improve user experience.

Bug Fixes:**Layout editor fix:**

Fixed an issue that previously prevented the reordering of elements in Pearl's layout editor.

API documentation:

Addressed multiple issues in the self-documented REST API guide for improved accuracy and usability.

Release 4.24.1

- For streamlined system integration, our enhanced REST API now offers a developer-access mode directly within the Pearl devices's web interface, enabling users to execute, copy, and paste API commands with ease.
- Delcom USB buttons now allow users to control Panopto, Kaltura, and Opencast events (start, stop, pause, resume) on Pearl devices.
- To better serve our European customers, we now offer the option to select an EU-hosted Epiphan Edge, resulting in expedited data transfer, decreased processing latency, and enhanced overall responsiveness. Epiphan Cloud EU servers only support Pearl devices on firmware version 4.24.1 or newer.
- Added support to embed audio into secondary Panopto channels for files stored locally, simplifying work-flows and enabling efficient content re-purposing.

Release 4.24.0

- An enhancement has been added to the Automatic File Upload (AFU) functionality on Pearl Nano, which when enabled, will allow Pearl Nano to automatically upload recorded files to Epiphan Edge for backup.
- A new optional setting has been introduced that will require a user to give confirmation before a scheduled Panopto or Opencast event can start. If this setting is activated and the event is not confirmed, the event will not commence as previously scheduled.
- Resolved an issue that prevented a Kuando Busy status lights that is connected to a Pearl Nano to not display the color yellow.
- Resolved an issue that caused Pearl Nano from connecting to and receiving a multicast RTSP stream from QSYS PTZ cameras.
- Fixed the H.265 range expansion issue on Pearl Nano.
- Added support for a new chipset found in USB to RS-232 adapters Pearl Nano. This new chipset will give users a wider choice of these adapters to send API commands to Pearl Nano

Release 4.23.1

- Implemented a new functionality that enables administrators to personalize the color settings of a multicolored, USB-connected 'on-air' status LED indicator.
- Implemented a functionality that allows users to pause and resume recordings with Panopto, Opencast, or YuJa platforms with the convenience of a programmable Delcom USB button.
- Resolved an issue with LDAP where certain characters in user credentials, specifically backslashes (\), double quotes ("), and hash symbols (#), were not being properly escaped.

Release 4.23.0

- Added support for Opencast Content Management System.
- For ad hoc or unscheduled Panopto events, added support to upload recordings directly into the device's default folder.
- With this release, should a reboot occur during a Panopto event, the recording will not only continue seamlessly but also, upon the event's conclusion at the predetermined time, it will autonomously upload to Panopto for processing, eliminating the need for any manual input.
- Added support for exFAT formatted USB drives for use with Automatic File Upload and USB file transfers.

Release 4.21.0

- Added support to schedule the start and stop times for recording and streaming using the premium version of Epiphan Edge. This requires a subscription to Epiphan Edge.
- Added file transfer progress indicator to the video preview screens as well as the Single-Touch screen on Pearl Mini and Pearl-2. This feature will help users monitor the progress of their uploads and avoid removing the storage in the middle of the transfer.
- Added the option to require user to enter a PIN to factory reset the device.
- Added option to require user to enter a PIN in order to apply built-in configuration presets using the front screen.
- Added a new counter to the SRT statistics called Reconnections to show the number of times a SRT connection disconnected and was successfully re-established.
- Added support to encode MP3 and AAC audio formats at 192 Kbps.
- Resolved a bug that caused recording failure when Pearl is configured to record a scheduled Panopto webcast event and at the scheduled start time, connection to Panopto is established but either Panopto does not respond in a timely manner or does not respond at all.

Release 4.20.0

- Added ability to apply a Pearl Configuration preset from an attached USB drive.
- Re-branded Epiphan Cloud to Epiphan Edge on web admin interface and front screen.
- Resolved an issue that leads to loss of input video signal when the name of a video source on Pearl web UI is changed to reserved key words.
- Provided better handling of HTTP error code 401 from YuJa Enterprise Video Platform.

Release 4.19.0

- Added support to lock the Record and Stream control keys on Pearl Nano's front panel using a PIN.
- Implemented a fix for an issue that prevented the upload of recorded files to Panopto. This problem is encountered when Pearl is rebooted while in the middle of uploading a recorded file to Panopto.

- Implemented a solution to identify and restore the XLR analog audio input capture when it fails due to grounding and/or external environmental issues.
- Resolved an issue that prevented Pearl from uploading files to existing subdirectories in an S3 bucket using AFU.

Release 4.18.0

- Added support for quickly connecting SRT inputs to Epiphan Connect
- Enhanced SRT inputs and outputs with buttons to quickly copy information to clipboard
- Enhancements made to Panopto integration; Pearls configured to record webcast events will now begin recording to local storage if Panopto cannot be reached at the scheduled start time.
- Improved discoverability of the Epiphan Live dashboard
- Resolved an issue in which some scheduled back to back events with Panopto, Kaltura, or Yuja CMS may not get recorded
- Bug fixes
- MPEG-DASH is no longer supported on Pearl Nano
- UPnP is no longer supported on Pearl Nano

Release 4.17.3

- An issue has been resolved wherein configuration presets that contained Epiphan Cloud data from one Pearl were applied to another Pearl which then caused a hard lock of that Pearl upon reboot. A better handling of this information has been implemented in this release to prevent the hard locking of these Pearls on reboot.
- An issue has been resolved wherein occasionally Epiphan Cloud team members were not able to access the Admin interface of a paired Pearl unit
- Bug fixes

Release 4.17.2

- Bug fix for the full frame rate preview in Epiphan Cloud Pro. HLS preview stream from Pearl to Cloud was not closing properly when preview was stopped, this has been resolved

Release 4.17

- Firmware version 4.17 is the last version to support connections to UPnP enabled devices
- SRT timestamp synchronization: When using SRT to connect a Pearl to another Pearl, or a Unify instance, it is now possible to enable automatic syncing of SRT streams. The Pearl acting as sender timestamps the packets, and the receiving Pearl can sync using those timestamps. This feature is activated on the receiving Pearl through a check box
- Support for Kuando BusyLight Alpha and Omega model 2
- Support for starting and stopping scheduled YuJa events early using Pearl
- Support for pausing and resuming YuJa events in progress using Pearl
- Support for extending a YuJa event in progress using Pearl management interface
- Addition of brute force password attack prevention. If the same IP address tries and fails to log in to Pearl 50 times in a row within 60 seconds, Pearl will block further attempts to log in from that IP address for 60 seconds
- Security vulnerability fixes
- Bug fixes
- Pearl Nano devices with a serial number starting with **GSAB** or newer will be unable to downgrade below firmware version 4.17. An error will occur if this is attempted and the firmware upgrade will be blocked

Release 4.16 (Pearl Nano only)

- 4K add-on now available for purchase
- H.265 encoding now available

Release 4.15

- Direct integration with the YuJa content management system lets you streamline your YuJa workflows for even more efficiency. Pearl can automatically start recording or streaming based on your schedule in YuJa and push files to the right folder on the platform
- Kaltura updates including Improved ad hoc events and My Dashboard integration
- MultiViewer onscreen options including on-air status, audio meters, channel status, and CMS event status
- SRT support upgraded to version 1.4.3 (better stability, more accurate statistics, and other improvements)

- Support for automatic file uploading via secure SMB2 and SMB3, improving compatibility with Windows-based systems
- Preset optimizations allow you to select which aspects of a created preset to apply to a Pearl device
- Lockable front screen on Pearl Nano for CMS applications

Release 4.14.3 (Pearl Nano only)

- Firmware 4.14.3 allows Pearl Nano users to dynamically scale the input source in the custom layout builder.
- The color range of the HDMI and SDI video inputs now includes black (0.0.0). As such, the color black (0.0.0) in the video signal is now accurately encoded as black instead of near-black

Release 4.14.2

- MultiViewer displays a custom mix of up to video sources including channels on the HDMI output port in a convenient grid for confidence monitoring with minimal impact to the system's processor.
- MultiViewer displays a custom mix of up to two video sources including the channel on the HDMI output port in a side-by-side grid for confidence monitoring with minimal impact to the system's processor
- Pause and extend CMS events
- Panopto device templates
- Live channel RTSP stream transport option
- Keyboard shortcuts
- Pearl as FTP server functionality removed.

Release 4.14.1

- One Touch control of streaming and recording
- Upload local webcast recordings to Panopto
- Locking the CMS start screen
- Pre-configured stream URLs for Kaltura webcasts
- Schedule CMS event uploads
- Adjustable fan speed
- Rotate the touch screen display 180 degrees without affecting the video at the output port

Release 4.14.0

- Inaugural release of Pearl Nano

Product overview

Learn about your Pearl device and get familiar with the various connectors and features.

Topics include:

- [Pearl Nano overview](#)
- [Front and back view of Pearl Nano](#)
- [Monitoring audio](#)
- [About 4K on Pearl Nano](#)
- [Pearl Nano AV inputs](#)
- [Pearl Nano Tech specs](#)
- [Pearl Nano Power adapter specifications](#)
- [Optimum System Load](#)
- [International character support](#)

Pearl Nano overview

Pearl Nano is a versatile and easy to use, single channel video recording and streaming hardware encoder that's great for lecture capture, corporate communications, and remote video contribution applications using live SRT feeds.



With Pearl Nano, you can capture, record and stream computer monitors and other video sources, including:

- SDI
- HDMI™
- HDMI 4K^{4K}
- DVI-I (single link)
- SRT and RTSP

Simultaneously capture up to two audiovisual sources and arrange them in a custom layout with transparent images and backgrounds.

Capture audio from dedicated XLR, USB, and RCA audio ports, as well as from SDI, HDMI, and network video sources (SRT and RTSP).

Stream to Content Distribution Networks (CDNs) worldwide using modern protocols like SRT and HLS. At the same time, you can stream to other destinations using RTMP/RTMPS or RTSP. Even multicast directly to viewers on your LAN so they can watch the live channel broadcast using a web browser or media player on smart devices connected to the same private network as Pearl Nano.



Download recordings using your web browser, or set Pearl Nano to automatically upload recorded files directly to a network server using FTP, RSYNC, CIFS, WebDav, and more. Pearl Nano is also fully integrated

with Kaltura, Panopto, and YuJa Content Management Systems (CMSs) and can be registered as a video remote recorder resource for seamless lecture capture.

Network security compliance with 802.1x protocols, passwords, and certificate authentication means an easier setup for IT friendly live streaming over enterprise networks. Pearl Nano is HTTPS enabled for secure administration and control over the LAN, and supports secure live streaming protocols like SRT with AES encryption and RTMPS.



Pearl Nano does not capture from HDCP encrypted sources.

Front and back view of Pearl Nano



Table 1 Pearl Nano front panel descriptions

Label	Name	Description
1	3.5 mm audio output jack	For audio confidence monitoring. Plays the audio for the currently visible channel.
2	SD card slot and LED indicator	Used to store up to 512 GB of recordings and user uploaded media files. For recommendations, see Pearl Nano Tech specs . A small LED lights when Pearl Nano is powered on and an SD card is installed. If a SATA M.2 SSD is installed, the SD card slot is no longer detected and the LED indicator does not light.
3	Front screen display	Used for confidence monitoring and for displaying the front screen menu system and device information.
4	Control keys	Used to navigate the front screen menu system and select options when configuring system parameters using the front screen menu system.

Label	Name	Description
5	Recording control key	Glows red when the device is recording. Flashing means that user action is required and recording has either stopped or won't start. Color is white when the system is powered on and not recording.
6	Streaming control key	Glows blue when the device is streaming. Flashing means that user action is required and streaming has either stopped or won't start. Color is white when the system is powered on and not streaming.



Table 2 Pearl Nano back panel descriptions

Label	Name	Description
1	12V DC power jack	Connect the power supply here to power on the device. The port requires a 12 V DC power source (center-positive). Always use the provided power adapter and tighten the screw lock securely onto the socket. To power down the unit, disconnect the power adapter from the device.
2	Cable lock	Allows Pearl Nano to be locked to a desk or surface using a laptop cable lock.
3	USB	A USB 3.0 (UAC) port for connection of external hard drives, flash drives, USB microphones, or supported USB status light indicators. Can be used to connect a USB mouse or keyboard when the local console feature is enabled. USB (UVC) devices are not supported.
4	HDMI OUT	An HDMI video output port, see Video output ports for details.

Label	Name	Description
5	PoE+ (RJ-45 Ethernet)	Auto-sensing gigabit Ethernet 10/100/1000 Base-T network port with support for RTSP and SRT networked video inputs and PoE+ network power. See Configure network settings for setup instructions.
6	SDI	An SDI video input port that supports 12G SDI.
7	HDMI PASS-THROUGH	An HDMI pass-through port that outputs the HDMI IN signal with no added latency.
8	HDMI IN	An HDMI video input port that supports HDMI and DVI signals (using an adapter) up to 4K with the optional 4K add-on, and up to 1920x1080 without the add-on. For more information, see About 4K on Pearl Nano .
9	RCA	RCA consumer line-level stereo pair (left/right) audio inputs. See Pearl Nano AV inputs .
10	XLR	Two XLR professional line-level, +4 dBu (balanced/unbalanced) jacks that can function as a stereo pair (left/right) or as two mono inputs. See Pearl Nano AV inputs .

Monitoring audio

The front panel includes a 3.5 mm headphones audio jack for monitoring audio. To monitor the audio for a channel, just select the channel using the device screen . The audio you hear depends on the audio source configured in the live channel layout.



Increasing the volume to 100% may cause you to hear distortion that is not actually present in the audio signal being recorded and streamed.

Adjust the volume on Pearl Nano

From the Channel view or when one of the video sources is displayed on the front screen, press the up and down arrow keys on the control key interface to adjust the volume. Each press changes the volume by 10% to a maximum volume of 100%. Turn the volume all the way down to mute.



You can also adjust the volume using the front screen menu when you select **System > Controls > Headphone volume**.

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

Audio VU meter

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

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

Pearl Nano	VU meter (mono)	
	VU meter (stereo)	

Table 3 Audio VU meter levels

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

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

- **Pearl Nano Front screen:** On the channel view and on each of the video input screens.
- **Admin Panel:** On the audio input source's configuration page when you select the input source from the Inputs menu. You can also add the VU meter to appear on the video output ports, see [Disable or enable audio and output port volume](#).

About 4K on Pearl Nano

Pearl Nano supports resolutions from low-res SD to 4K, which means that you can use it to capture 4K UHD digital signals. You need the 4K feature add-on to access this feature, see [Add-ons overview](#).

4K feature add-on

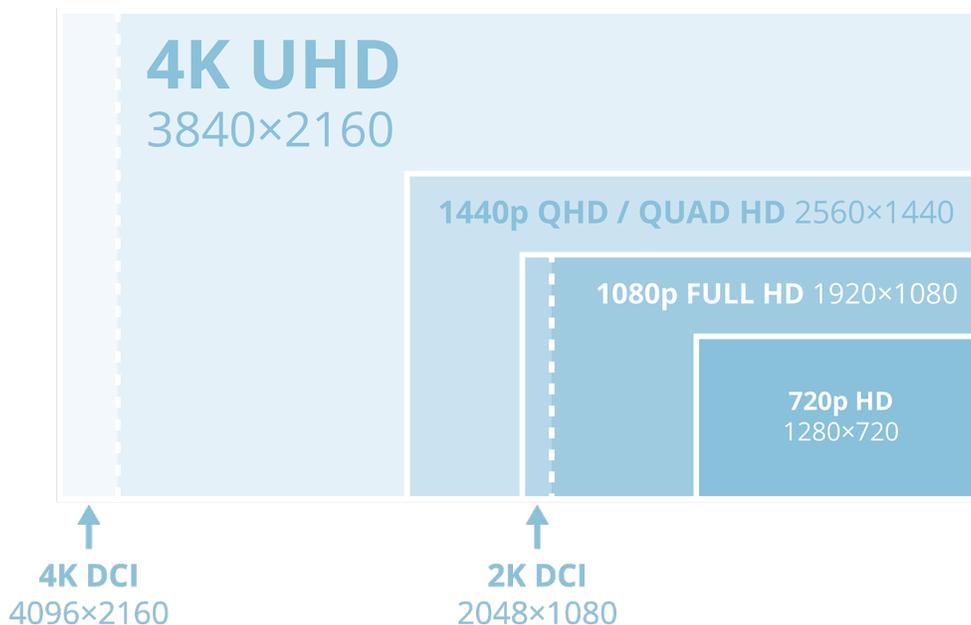
The 4K feature provides Pearl Nano with the following 4K features:

Specification	Pearl Nano
4K video inputs	2 (1 HDMI and 1 SDI)
4K Hardware scaling (4K down to full HD)	2
4K video outputs (HDMI)	1 pass through port
4K video encoding	1

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

4K UHD vs. DCI 4K

DCI 4K and 4K UHD are different definitions of a 4K resolution. 4K UHD (3840×2160) is the standard 4K resolution available on televisions and other common display screens. The 4K resolution of 4096×2160 is referred to as Digital Cinema Initiatives (DCI) 4K, and is the resolution used almost exclusively for cinema-scale film production. It is rare to find this resolution outside of a cinematic context. Pearl Nano is not capable of supporting input and output at DCI 4K and only supports standard 4K UHD with the 4K feature add-on.



Pearl Nano AV inputs

We recommend having up to two video sources added to the custom layout in Pearl Nano's single, full HD channel.

One of the video sources can be either an SRT or an RTSP networked source; however, you cannot connect more than one networked source at the same time. Pearl Nano supports use of common signal converters and input adapters.

Table 4 Pearl Nano Input Ports

Input port	Qty	Details
SDI ¹	1	Linear PCM audio/video input. Supports 12G SDI video input.
4K HDMI ²	1	Linear PMC audio/video input, non-HDCP protected. DVI-I (using an adapter) is single link. Supports up to 4K with the optional 4K add-on. Supports 1920x1080 full HD video input without the 4K add-on. For more information, see About 4K on Pearl Nano .
USB 3.0	2	Linear PCM audio inputs on the rear panel accept non-HDCP protected content. Use to connect a single UAC device, such as a USB microphone. Can also connect to external hard drives, flash drives, and control interfaces. USB (UVC) devices are not supported.

Input port	Qty	Details
RJ-45	1	One SRT source over Ethernet at 1920×1080@30 fps.
		One RTSP source over Ethernet at 1920×1080@30 fps.
RCA ³	2	RCA consumer line-level audio inputs function as a stereo pair (-10 dBV). <ul style="list-style-type: none"> • White = left • Red = right
XLR ³	2	Two XLR audio inputs operate as a stereo pair (left/right) by default. <ul style="list-style-type: none"> • XLR 1 = right • XLR 2 = left You can configure the ports to operate as independent mono inputs using the Admin panel, see Configure audio ports for stereo or mono . XLR inputs accept balanced and unbalanced, professional line level signals with a maximum of up to 12.3 VRMS, +24 dBu.

¹ SD-SDI audio is not supported.

² Requires 4K feature add on

³ In the Admin panel, XLR/RCA includes audio signals from the XLR audio pair and the RCA audio pair by default. You can disable one or the other using the Admin panel, see [Assign audio sources to an input](#).

Only content that is not HDCP-protected is captured from HDMI and SDI sources. HDCP-protected content may appear as a green screen on Pearl Nano.



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

Pearl Nano Tech specs

The input and output connectors are listed for Pearl Nano.

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

Table 5 Specifications for Pearl Nano

Video inputs	Local video inputs	(1) 12G SDI (1) 4K HDMI ¹ and 2
	Video over Ethernet ³	(1) RTSP (1) SRT (push)
	Connectors	(1) BNC (female) (1) HDMI type A (female) (1) USB-A (female) (1) RJ-45 (female)
	Aspect ratios	3:2, 4:3, 16:9, 16:10, and custom aspect ratios
	Standard resolutions	PAL, PAL wide, NTSC, NTSC wide
	Resolution range	640×480 to 4K
	Frame rate	Up to 60 fps
	Input color spaces	HDMI: RGB 4:4:4, YC _R C _B 4:2:2, YC _R C _B 4:4:4 SDI: YC _R C _B 4:2:2
	Interlacing	Yes
	Maximum cable length for SDI	300 ft
	Maximum cable length for USB 3.0	6 ft
Audio inputs	Analog audio inputs	(2) XLR pro line level (+4.0 dBu) up to 12.3 V _{RMS} , +24 dBu (balanced/unbalanced, mono or L/R stereo pair) (1) RCA consumer line level - 10 dBV (L/R stereo pair)
	Connectors	(2) XLR (female) (2) RCA (female)
	Digital audio inputs ⁴	(1) SDI ⁵

		(1) HDMI (1) USB (1) RTSP (embedded over Ethernet) (1) SRT (embedded over Ethernet)
	Connectors	(1) BNC (female) (1) HDMI type A (female) (1) USB-A (female) (1) RJ-45 (female)
	Gain control	0 dB to +30 dB
	Mute	Yes
	Configurable audio delay	-300 ms to +300 ms
Video processing	Video output color space	4:2:0, 8 bits per color
	Video codec	H.264/AVC (ITU H.264, ISO/IEC 14496-10) 4:2:0, 8 bit color <ul style="list-style-type: none"> • Encoding profile: High, Main, Baseline • Profile levels: 3.0, 3.1,3.2,4.0,4.1, 5.1 H.265/HEVC (ITU H.265, ISO/IEC 23008-2:2013) 4:2:0, 8 bit color <ul style="list-style-type: none"> • Encoding profile: Main • Profile level: 5.1
	Bitrate	1 to 50 Mbps (selectable)
	Bitrate control	Constant
	Video scaling	Software and hardware
	Key frames	1/2 s, and 1 s up to 5 s in 1 second intervals

Audio processing	Compression	MP3, AAC, and PCM
	Sampling rate	MP3: 22 kHz, 44 kHz, 48 kHz AAC: 16 kHz, 22 kHz, 44 kHz, 48 kHz PCM: 22 kHz, 44 kHz, 48 kHz
	Bitrate	64 to 320 kbps (MP3 and AAC)
Video output	Signal types	(1) HDMI 2.0 (port 1) (1) HDMI 2.0a pass-through (port 2) (1) H.264/AVC digital video over Ethernet (1) RTSP (1) SRT (push) (1) HLS (push)
	Connectors	(2) HDMI (1) RJ-45 (female)
	Encoded channels	One 1080p channel at 60 fps with up to two full HD video sources, or one 4K channel at 30 fps with up to 4K video sources (recommended)
	Streaming protocols	MPEG-TS, and FLV RTSP over TCP/UDP RTMP/RTMPS SRT (push) over UDP HLS (push) over HTTP/HTTPS HLS (pull) - Native Apple HTTP/HTTPS stream for iPad, iPhone and iPod Touch
	Stream encryption and authentication	SRT: 128 bits, 192 bits, or 256 bits AES encryption (negotiated) and configurable passphrase HLS (push): MD5, SHA-256, and SHA-512 RTMPS: encryption plus CA certificate negotiation
	Resolution ranges	Recorded: 480p to 4K

		Streamed: 480p to 4K HDMI output ports: 480p to 1080p HDMI passthrough: 480p to 4K
	Frame rate	Up to 60 fps
	Formats	H.264/AVC (ITU H.264, ISO/IEC 14496-10) 4:2:0, 8 bit color <ul style="list-style-type: none"> • Encoding profile: High, Main, Baseline • Profile levels: 3.0, 3.1,3.2,4.0,4.1
Audio output	Analog audio output	(1) 3.5 mm stereo headphone jack
	Digital audio outputs	RTSP and SRT audio over Ethernet HLS audio over HTTP/HTTPS HDMI audio (embedded)
Monitor and control	Front screen	2.2 inch screen monitor (built in) resolution: 320x240
	Control key interface	Front panel control keys and multi-function keys
	USB keyboard	Connect a standard USB keyboard (optional)
	USB status light	Connect a single USB status light (optional), supported models: -Kuando BusyLight models: UC Alpha and UC Omega -Delcom Products USB HID single color and multi-color signal indicators

Recording and storage	Record formats	AVI, MOV, MP4, and MPEG-TS
	File upload formats	JPEG, PNG
	SD card	Up to 512 GB ^{7,8}
	File system for SD card	EXT4
	Internal storage	SATA M.2 2280 SSD storage ⁷ (M Key connector)
	File transfer protocols	FTP, SFTP, SCP, AWS S3 client, and WebDAV client RSync
	Network file share protocols	CIFS/SMB2+
	File system for USB storage	FAT16, FAT32, XFS, EXT2, EXT3, EXT4, NTFS
	External USB port	(1) USB 3.0 (UAC)
	Bitrate	Up to 50 Mbps
Communication	USB standards	USB 1.1, USB 2.0, and USB 3.0 HDCP compliant. Only content that is not HDCP-protected is captured.
	Serial port	(1) Bidirectional RS-232 (via a USB to serial adapter)
	Serial protocols	Data bits: 7 or 8 (default) Stop bits: 1 Parity: None Flow control: None, Hardware or Software
	Serial port baud rate	19200 bps
	Ethernet host port	(1) RJ-45 (female)
	Ethernet data rate	10/100/1000 Base-T, half/full duplex with autodetect
	Maximum Transmission Unit	68 to 1500 MTU (configurable)
	Protocols	DHCP Option 81, TLS 1.2, LDAP, mDNS, DDNS, SAP,

		RTP, MPEG-TS & RTP and MPEG-TS/UDP, 802.1x, EAPOL, EAP-TTLS, EAP-TLS, PEAP, HTTP, HTTPS, NTP, PTP, FTP, SFTP, SCP AWS S3
	Network discovery/Announce	SAP
Network security	802.1x EAP methods	PEAP, EAP-TLS, EAP-TTLS
Administration and control	Admin panel	Local web UI for full administration. On-screen display and mobile UI for confidence monitoring, administration, and control. Local Admin panel access using an external monitor and a USB mouse or keyboard connected directly to Pearl Nano plus front screen monitor support.
	Epiphan Edge	Cloud-based platform to remotely manage and control Pearl Nano devices. Start and stop recording/streaming, monitor sources and alert dashboard, remotely login to Admin panel for rescue troubleshooting, update firmware and more from the Internet.
	Secure access	Multiple user accounts and passwords. HTTPS for secure Admin panel access, as well as local network access to the live channel broadcast.
	Remote access:	Remote login ⁹ to the cloud version of the Admin panel.
	API	Yes (HTTP/HTTPS or RS-232)
	Crestron driver	Yes See https://applicationmarket.crestron.com/epiphan/
Integrations	Content Management Systems	Kaltura Panopto YuJa Opencast

	Cloud access and management	Epiphan Edge
AC/DC power adapter	Model	SYS1588-3012
	Input power rating	90 to 240 VAC, 1.5 A _{RMS} , 47 to 63 Hz
	Output power rating	12 VDC, 2.5 A, 30 W
	Active efficiency (average):	87.7%
	Efficiency (10% load):	86.5%
	No load consumption:	0.1 W
	Power adapter manufacturer	Sunny Computer Technology Europe, s.r.o Trnkova 156, 628 00 Brno Czech Republic
General	Operating temperature	32° to 104° F (0° to 40° Celsius)
	Cooling	Fan air flow: Left to right
	Enclosure	Metal
	Form factor	Portable desktop model, VESA mountable
	Dimensions (W × D × H)	1.13" × 5.91" × 1.69" (206 mm × 150 mm × 43 mm)
	Weight	2.0 lbs (907 kg)
	Power supply	External AC/DC power adapter: 90 to 240 VAC/12 VDC, 2.5 A, 47 to 63 Hz PoE+ (802.3at)
	Input power rating	External AC/DC power adapter: 12 VDC, 1.5 A _{RMS} , 34 W PoE+ (802.3at): 44 to 57 VDC, 25.5 to 30 W
Regulatory compliance	FCC compliance: Part 15	
	CE compliance: Directive 2014/30/EU - Electromagnetic Compatibility Directive 2014/35/EU - Low Voltage Directive	

	Directive 2011/65/EU - RoHS
Time synchronization	NTP, TIME (RFC 868), PTP v1 (IEEE-1588-2002 V1)
Country of origin	Made in Malaysia.

¹ Requires 4K feature add on.

² HDCP compliant. Only content that is not HDCP-protected is captured from HDMI

³ One of the video sources you connect can be either an RTSP or an SRT source; however, you cannot connect more than one of these sources at the same time.

⁴ Digital audio is de-embedded from the digital source.

⁵ SD-SDI audio is not supported.

⁷ User supplied.

⁸ SD card is reserved for system use and cannot be used to transfer files to other devices like a laptop. Use a USB memory device to manually transfer files instead.

⁹ Requires an Epiphan Edge Pro account.

Pearl Nano Power adapter specifications

An AC to DC power adapter model SYS1588-3012 comes with your Pearl Nano.

Table 6 AC to DC power adapter SYS1588-3012 specifications

Parameter	Value
Input voltage	90-240 VAC
Input AC frequency	47 to 63 Hz
Output voltage	12 VDC
Output current	2.5 A
Output power	30 W
Active efficiency (average)	87.7 %
Efficiency (10 % load)	86.5 %
No-load consumption	0.1 W
Manufacturer	Sunny Computer Technology Europe, s.r.o Trnkova 156, 628 00 Brno, Czech Republic

Optimum System Load

While Pearl Nano is powerful, there is a limit to the number of concurrent tasks the onboard CPU can perform efficiently.

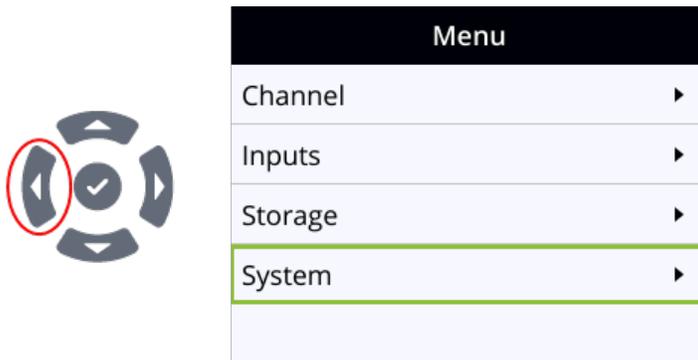
The number of concurrent tasks depends on many factors, such as:

- the number of video sources
- what frame rate and bitrate is used for a channel
- if the video output ports are used
- if a live monitor is connected to the HDMI output port (about the equivalent of an encoded 1920×1080@30 fps channel)

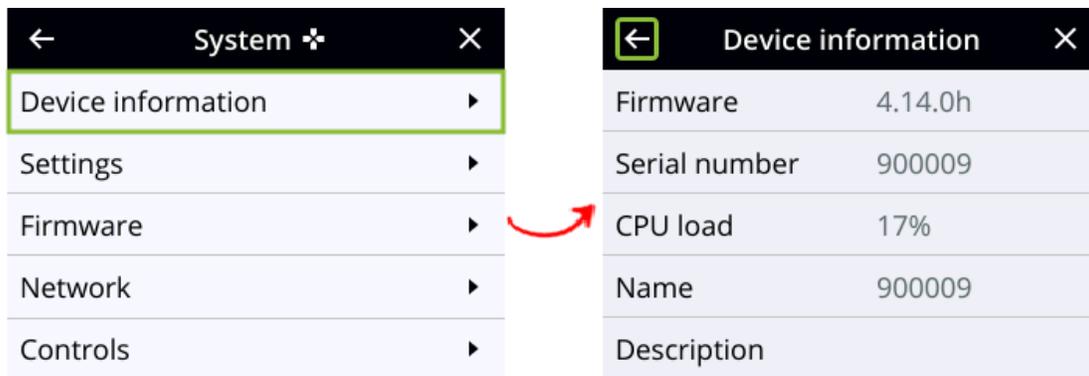
For best results, we recommend keeping System load usage under 70%.

Check CPU usage on Pearl Nano's front screen

To check the CPU usage from the front screen menu, repeatedly press the **left arrow** key on the control interface until the Menu screen displays.



Use the arrow and check mark keys to select **System**, and then select **Device information** to display the Device information screen.



Recommendations

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

- Disable the video output port (if unused).
- Stop channel(s) that are streaming or recording.
- Ensure video sources come in at the right resolution so that Pearl Nano doesn't have to up scale or down scale the video source.

International character support

You can include certain international characters in the channel name, layout name, video and audio input names, text overlays, and in the name of recorded files. Common character sets for the following languages are approved:

- **Western European/Nordic languages:** Danish, Dutch, English, French, German, Icelandic, Italian, Norwegian, Portuguese, Spanish, and Swedish.
- **Central/Eastern European languages:** Bosnian, Croatian, Czech, Hungarian, Polish, Romanian, Slovak, and Russian.

Important considerations

- Use only alphanumeric and diacritic characters in metadata descriptions. The whole metadata string is refused if any special currency or mathematical symbol appears in the description. You must remove the offending characters before Pearl Nano will accept the description, see [Add or remove channel metadata](#).
- Do not include any special currency, mathematical symbols, and other special characters such as slashes or spaces in the channel name. Pearl Nano replaces special characters with an underscore.

Quick start

After you've unpacked your Pearl Nano, you're ready to get started. This quick start uses the default settings where possible so you can quickly start using your Pearl Nano.

Before you begin, make sure you have:

- A video source such as a camera or computer and cables to connect them to the Pearl Nano. For HDMI, the video source must not be HDCP protected.
- An audio source coming from either your SDI or HDMI video source (must not be encrypted). Optionally, audio from a different source such as an audio mixer that you connect to the audio input ports can be used.
 - The Pearl Nano can use the USB input for audio input.
- Local area network that uses Dynamic Host Configuration Protocol (DHCP) is preferable.
- Computer with a web browser connected to the same network. We'll call it the "admin" computer.
- Ethernet cables to connect the Pearl Nano and the admin computer to the network.
- To record video using Pearl Nano, you need to install a storage medium. Pearl Nano has a standard SD card slot on the front panel that you can use.
 - We recommend an SD card that is at least a class 10 with up to 512 GB of capacity.
 - Pearl Nano also has a SATA M.2 2280 SSD storage expansion slot that's accessible from the underside.

Your Pearl Nano comes shipped with an AC/DC power adapter and a registration card that contains brief instructions to connect the Pearl Nano to the network and log in to the Admin panel, and format an SD card. The instructions in this quick start provide more details.

Start up the Pearl Nano for the first time

1. Turn on your camera or video source and connect the output to the back panel of the Pearl Nano.



2. Connect the Ethernet cable to the Pearl Nano and to your network. Pearl Nano can power up using the power from the Ethernet cable if your network supports PoE+ power. If you are using PoE+ power with a Pearl Nano, you can skip the next step.



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



If you are using a Pearl Nano and your network supplies PoE+ power, then you can skip this step.

4. Turn on the system:
 - **Pearl Nano** - will automatically turn on when connected to power. Wait for the power-up cycle to complete and the Auto channel to appear on the front screen. If your video source has a signal, the video displays on the front screen. If you don't see the Auto channel displayed on the front screen, press the **left arrow** key on the control key interface to cycle through the different views.
5. (Required for recording on Pearl Nano) Install and format a storage solution. For more information, see [Install and format an SD card for the Pearl Nano](#) or [Install and format a SATA M.2 2280 SSD for Pearl Nano](#).
6. (Optional) Plug headphones into the 3.5 mm headphone jack at the front of the Pearl device to monitor the video signal's embedded audio. For more about monitoring audio, see [Monitoring audio](#).
7. (Optional) Start recording:
 - a. **Pearl Nano** - press the **Record** key on the front panel to start and stop recording the channel.

Recordings are saved to the SD card on Pearl Nano by default. When the SD card is full, new recordings overwrite the oldest recordings. Do not eject the SD card while recording is in progress as that may corrupt the SD card.

Next Steps

Now that you have a video source connected (and an SD card installed and formatted for Pearl Mini and Nano), you can fine-tune Pearl device to your exact requirements. Take a look at topics such as:

- [Register your device](#)
- [What is a channel?](#)
- [Custom layout configuration](#)
- [What is streaming?](#)

- [Selecting an audio source](#)
- [Video output ports](#)
- [Automatic file transfers](#)

When you're done setting up your Pearl device, make sure to back up the system configuration using the procedure described in [Create a configuration preset](#).

Pearl Nano sample recording

When you power up Pearl Nano, you can start recording as soon as you connect a video source to one of the video input ports and have a formatted SD card installed.

Record the default Auto channel using the Record control key

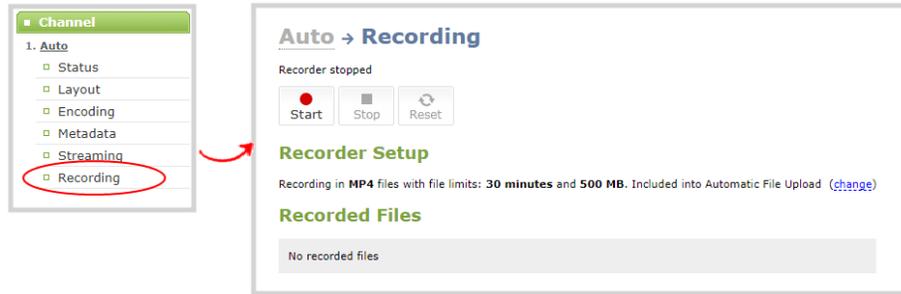
To record the default Auto channel using the control key on the front panel of Pearl Nano, simply press the **Record** key. When you're done, press the **Record** key again to stop. The Record key is lit red while recording is in progress.



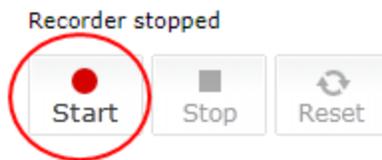
Record the default Auto channel and download the file using the Admin panel

The SD card uses the EXT4 format and you cannot manually transfer recordings off the SD card directly to iOS or Windows systems. Instead, download your recording using the Admin panel .

1. Open a web browser on the admin computer and go to the IP address of your Pearl Nano and log in, see [Access network IP address and Admin panel](#).
2. From the **Channel** menu in the Admin panel, select your channel (i.e. Auto) and select **Recording**. The Recording page for the channel opens.



3. Select **Start** to start recording the channel and click **Stop** when you're done.



4. Refresh the page to see the newly recorded file appear in the Recorded Files list.

5. Select the file in the list and download that recording to your admin computer.

Register Pearl Nano to get firmware updates

Keep Pearl Nano up-to-date and get all the latest features and firmware updates. Registering your Pearl Nano is free and only needs to be done once. You can register anytime from the Firmware update page using the Admin panel, see: [Register your device](#).

Setup

This section contains tasks that are needed to get Pearl Nano configured.

Topics include:

- [User interfaces and remote access](#)
- [Configure network settings](#)
- [Configure network security](#)
- [Configure date and time](#)
- [Configure device info, name, description, and location](#)
- [Install and format an SD card for the Pearl Nano](#)
- [Audio input ports](#)
- [Video output ports](#)
- [Feature add-ons](#)
- [Connect an external keyboard](#)
- [Connect a USB status light](#)
- [Configuration presets](#)
- [User administration](#)
- [Status and monitoring](#)

For information about integrating with a Content Management System (CMS), like Panopto, and related administrator tasks, see: [Integration](#).

Access network IP address and Admin panel

You can get the network IP address of your Pearl device from the front screen menu. With the device IP address, you can access the Admin panel to do things like configure the Pearl device, start/stop recording, and more. Make sure that your admin computer is connected to the same network as Pearl device and that the network uses DHCP.



If your network requires you to assign the Pearl device a static IP address instead of using DHCP to obtain one, contact your network administrator and see [Connect using persistent static IP address](#).

Obtain the IP address of the Pearl device and access the Admin panel

1. Press the **left arrow** on the interface until the **System status** screen appears. On the Pearl 2 and Pearl Mini, you will have to press the **gears** icon first.

System status	
IP address	10.113.1.101
Firmware	4.14.0i
Uptime	07:22
CPU load	9%
SD card	111 GB of 111 GB
USB storage	Not detected

2. Using a browser on the admin computer, enter the URL for your Pearl device and include **/admin** to access the Admin panel.

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

For example: http://192.1.10.100/admin

3. When prompted, log in using the default user name **admin** and the administrator account password. If you don't know the password, contact your Pearl system administrator.



For a first-time set up, you're prompted to assign passwords to the **admin, operator,** and **viewer** accounts. Record the passwords for future reference.

4. (Optional) Open a new tab in your browser and enter the URL to preview a channel.

```
http://<IP Address for Pearl device>/preview.cgi?channel=1
```

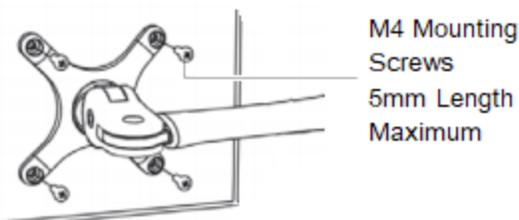
For example: http://192.1.10.100/preview.cgi?channel=1

For more details about accessing the Admin panel, see [Connect to the Admin panel](#). For more information about user accounts and passwords, see [User types and privileges](#).

Vesa mounting the device

The rear panel of the Pearl Mini and Pearl Nano has vesa mounting holes to fit a standard, 75mm × 75mm vesa mount. Use four M4 screws with a maximum length of 5mm to mount the plate to the rear panel of the Pearl device.

75mm x 75mm Hole Pattern



Do not insert screws longer than the recommended 5mm. Using longer screws can damage the device.

User interfaces and remote access

Pearl Nano has multiple user interfaces:

- **Front screen and control keys:** Easily accessible on the front panel of Pearl Nano, the front screen and control key interface are primarily used for easy device setup, confidence monitoring, and One Touch streaming and recording control, see [About the front screen and control key interface](#).
- **Admin Panel:** A web-based user interface that's primarily used to perform system set up and administrative tasks for your Pearl device. You can access the Admin Panel using an internet browser on a computer or tablet that's connected to the same local Ethernet network as your Pearl device, or locally using a USB mouse, keyboard, and monitor connected directly to the Pearl device. See [About the Admin panel](#).

Start and stop recording/streaming, monitor video sources, view status and alerts, remote rescue troubleshooting and more over the Internet using Epiphan Edge, see [Cloud-based device management](#). For remote login access to your Pearl device, see [Remote login to the Admin panel and Epiphan Live](#).

Pearl Nano's front panel control interface

Pearl Nano's front screen and control key interface have many functions, including confidence monitoring, starting and stopping recording and streaming, configuring settings using the front screen menu, loading configuration presets, viewing system information, and more.

Topics include:

- [About the front screen and control key interface](#)
- [The front screen Channel view](#)
- [The front screen menu and control keys](#)
- [Record and stream using the control keys](#)
- [Dim the front screen and control interface](#)
- [Set the Pearl device screen timeout](#)
- [Set a PIN security code](#)
- [One Touch streaming and recording control](#)

To view system information using the front screen, see [View system status using the front screen menu](#).

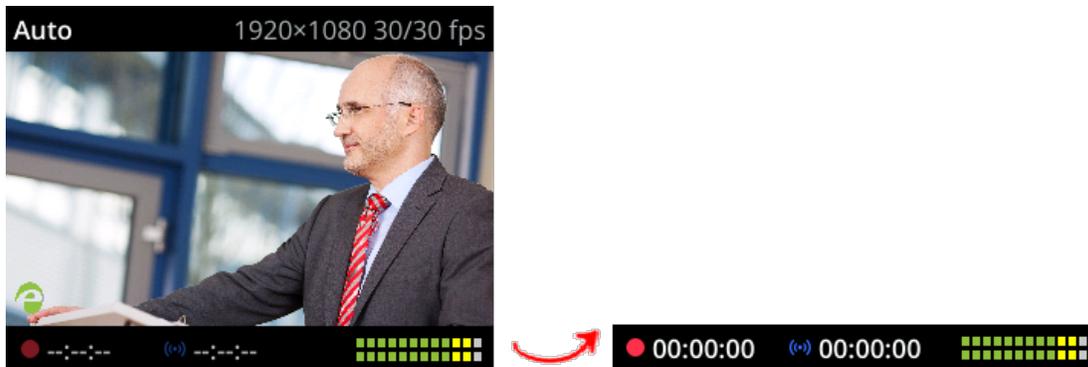
To select the video source for the output port using the front screen when local console is enabled, see [Select the video output source using the device screen](#).

To start and stop scheduled and ad hoc events for Kaltura and Panopto using the front panel control interface, see [Stop/start scheduled CMS events using Pearl Nano's front screen menu](#).

About the front screen and control key interface

Pearl Nano's front screen and control key interface has multiple uses, including confidence monitoring, basic configuration, diagnostics, plus quick access streaming and recording control.

When you power on , the Channel view displays the Auto channel by default. In this example, the auto channel shows a video source that is connected. Dashes in the footer indicate there is no record medium installed yet (i.e. no SD card or SATA M.2 SSD installed) and no streams are configured for the channel. Otherwise, the record and stream timers would appear at the bottom of the screen.



 If no video sources are connected or your sources aren't sending a signal, the Channel view shows the no signal image.

If you don't see the Channel view displayed on the front screen, press the **left arrow** key (or the right arrow key) on the control key interface to cycle through the different views. You can use the control keys to change views on the front screen and navigate the front screen menu. Pressing the **check mark** key selects a highlighted menu option.



The Record and Stream control keys on the front panel are used to start and stop recording or streaming, respectively. Their color and brightness change under different conditions.

Table 7 Front panel record and stream control key conditions

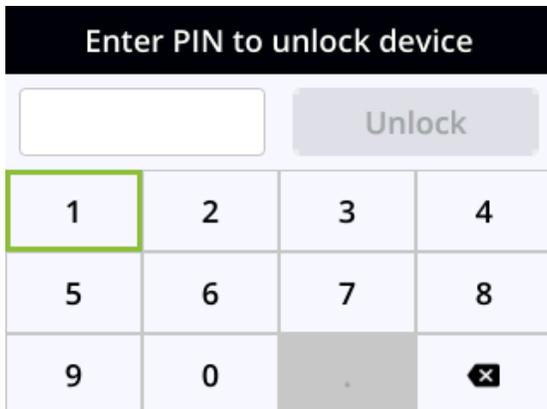
Icon	Description
	Record control key used to stop and start recording the channel. <ul style="list-style-type: none"> Glows solid white when an SD card (or SATA M.2 SSD) is installed and formatted.

Icon	Description
	<ul style="list-style-type: none"> • Glows solid red when the channel is actively recording. • Flashes red on/off if there is an error while recording. • Solid off (white) when no storage medium is installed and formatted, or when Pearl Nano is powered off.
	<p>Stream control key used to stop and start streaming the channel.</p> <ul style="list-style-type: none"> • Glows solid white when a stream is configured for the channel. • Glows solid blue when the channel is actively streaming. • Flashes blue on/off if there is an error while streaming. • Solid off (white) when no stream is configured for the channel or when Pearl Nano is powered off.

A default No Signal screen appears if no video sources are connect to Pearl Nano for the Auto channel to pick up. The No Signal screen also appears if the channel's layout does not include the video source when the Auto channel has been renamed and is no longer functioning as an automatic channel.



By default, full access to the front screen and control interface is enabled. To control access to the front screen and control interface, you can set a PIN using the Admin panel. When a PIN is set, the front panel controls are locked. Users must unlock the screen to access the different views on the front screen and to start/stop streaming or recording using the Record and Stream control keys.



A virtual keyboard for entering the PIN appears on the front screen; however, you can connect an external USB keyboard if Pearl Nano is configured to allow that.

Related links

[The front screen Channel view](#)

[The front screen menu and control keys](#)

[Record and stream using the control keys.](#)

[Dim the front screen and control interface](#)

[Connect an external keyboard](#)

The front screen Channel view

After you power on the Pearl Nano, the Channel view displays automatically. If you don't see the Channel view displayed on the front screen, press the **left arrow** key on the control key interface to cycle through the different views.





You can hide the header and footer bars on the Channel view by pressing the **check mark** key. Press the **check mark** key again to show the header and footer bars.

Table 8 Parts of the front screen for the Channel view

Item	Description
1	Channel resolution and frame rate.
2	Channel name.
3	Preview of the channel video source used for confidence monitoring. If no video source is connected or there is no video signal, the default No Signal screen displays.
4	Recording indicator and timer. The recording timer shows the length of time that recording has been in progress. If dashes appear in place of the timer, there is no SD card or SATA M.2 SSD installed and formatted.
5	Streaming indicator and timer. The streaming timer shows the length of time that streaming has been in progress. If dashes appear in place of the timer, there are no streams configured for the channel.
6	Audio VU meter using quasi-peak ballistics with samples averaged every 10 ms. The maximum average audio level in each 100 ms period is displayed using colored bars. <ul style="list-style-type: none"> • RED = 0 to -9 dBFS • Yellow = -9 to -18 dBFS • Green = -18 dBFS and lower

The front screen menu and control keys

The front screen menu lets you view Pearl Nano settings and do basic configuration, like setting a static IP address and choosing which video source appears on the HDMI OUT port. The control key interface on the front panel lets you change views on the front screen and navigate the front screen menu.



Menu	
Channel	▶
Inputs	▶
Storage	▶
System	▶

If you don't see the front screen menu displayed on the front screen, press the **left arrow** key (or the right arrow key) on the control key interface to cycle through the different views. Pressing the left arrow key is mentioned throughout the user guide, but you could use either key to navigate.

Pressing the **check mark** key selects a highlighted option. In this example, pressing the **check mark** key while **Channel** is highlighted on the Menu screen opens the Channel screen. The small arrow head at the end of a row indicates more options.

Menu	
Channel	▶
Inputs	▶
Storage	▶
System	▶



Channel	
Recording	▶
Streaming	▶

The check mark key also toggles a switch on and off.

Network	
Connectivity status	▶
DHCP	<input checked="" type="checkbox"/>
IP address	10.113.1.199
Network mask	255.255.255.0
Network gateway	10.113.1.1



Network	
Connectivity status	▶
DHCP	<input type="checkbox"/>
IP address	▶
Network mask	▶
Network gateway	▶

Darkened rows are not selectable and the fields are read only. In the example DHCP enabled screen, the IP address, Network mask, and Network gateway are all read only fields.

There are many functions you can perform using the front screen menu, like temporarily dimming the front screen and control keys when you select **System > Controls > Front screen**. Just press any key on the front panel of Pearl Nano to restore the screen and key luminance.

Record and stream using the control keys

Simply press the **Record control key** on Pearl Nano's front panel to easily start and stop recording a channel. The Record control key glows solid red and the recording timer on the Channel view increments while recording is in progress. When you're done, press the Record control key again to stop recording.



A formatted SD card (or SATA M.2 2280 SSD) must be installed and formatted before you can record video, see [SD card and SATA M.2 2280 SSD storage](#). If no record medium is available, dashes display in place of the recording timer and the Record control key does not light.

To start and stop streaming, simply press the **Stream control key** on Pearl Nano's front panel to easily start and stop streaming a channel. The Stream control key glows solid blue and the streaming timer on the Channel view increments while streaming is in progress. When you're done, press the Stream control key again to stop streaming. If multiple streams are configured for the channel, pressing the Stream control key starts and stops all streams at the same time.



A stream must already be configured for the channel. If no stream is configured, dashes display in place of the streaming timer and the Stream control key does not light. To configure a live stream, see [Streaming to a CDN, multicasting, and streaming to multiple destinations](#).

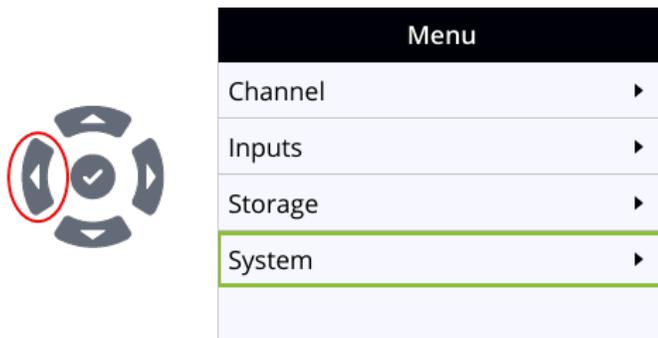
Pearl Nano also features One Touch control, which lets you start/stop streaming and recording at the same time with the touch of a button. For more information, see [About One Touch streaming and recording](#).

Dim the front screen and control interface

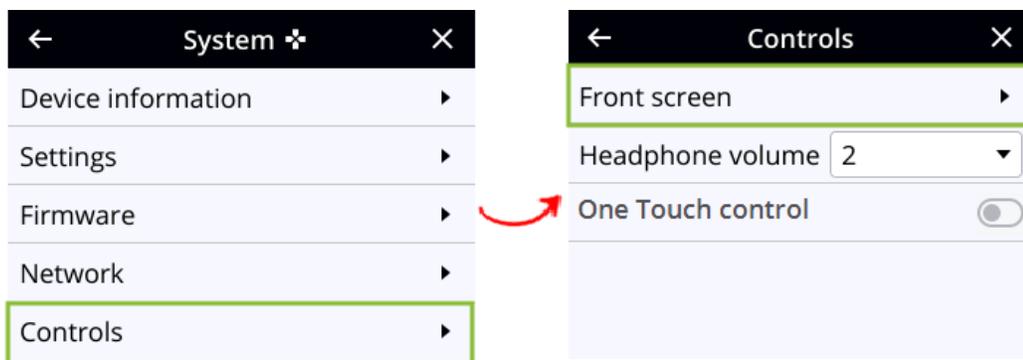
You can temporarily dim the front screen and control keys using the front screen menu. Just press any key on the front panel of Pearl Nano to restore the screen and key luminance. Alternatively, you could set an inactivity timeout and automatically dim the screen and control keys using the Admin panel, see [Set the Pearl device screen timeout](#).

Dim the front screen and control interface using the front screen menu

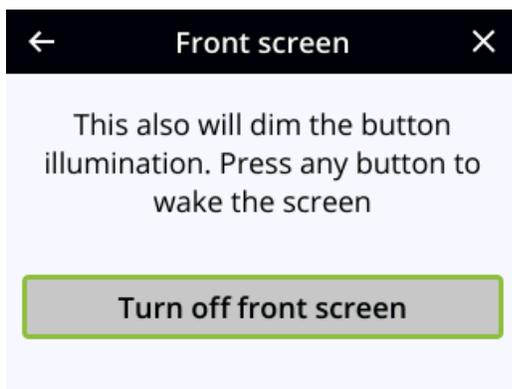
1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Controls** to open the Controls screen.



- From the Controls screen, press the **check mark** key to select **Front screen**.



- Press the **check mark** key to **Turn off front screen** or press the **left arrow** key to return to the previous screen without dimming the front screen and control key interface.

Set the Pearl device screen timeout

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

- Press any key on the front panel of Pearl Nano.

Set the screen timeout using the Admin panel

- Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
- From the Configuration menu, select Touch Screen (Front Screen for Pearl Nano). The Touch screen/Front screen configuration page opens.
- Enter the number of seconds before the screen automatically shuts off in the **Timeout** field. A value of 0 keeps the screen on at all times when the system is on.
- Click **Apply**.

Set a PIN security code

You can set a PIN code to protect the Pearl device screen from unauthorized access. By default, the PIN is not set.

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

- You power on or restart the Pearl device.
- The Pearl Nano recovers from timeout mode, see [Set the Pearl device screen timeout](#).

If you set a PIN when the start screen is in locked mode, a lock appears in the top right of the start screen. You must enter the PIN to unlock the start screen, access other screens, and use the Record and Stream Control keys to start and/or stop recording or streaming. When you return to the Single Touch control or CMS start screen, the Pearl device automatically locks itself and you must re-enter the PIN to unlock the screen.

If no PIN is set when the start screen is in locked mode, you can access the configured start screen right away. Anyone can quickly start/stop streaming and recording if the Single Touch control start screen is configured, or start/stop an event if the start screen is configured for Content Management System (CMS). However, no other screens are accessible using the Pearl device screen.

Set a device screen PIN security code using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Touch Screen (Front screen for Pearl Nano)**. The **Touch screen/Front screen configuration** page opens.
3. Enter a 4 to 12-digit PIN code in the **PIN** field, then click **Apply**. The Pearl Nano can only accept 4 digits.



Record the PIN code in a safe location for future reference. You need this PIN to access the Pearl device screen.

One Touch streaming and recording control

You can easily control both streaming and recording with the press of a single button on the front panel of Pearl Nano.

Topics include:

- [About One Touch streaming and recording](#)
- [Enable One Touch control](#)

About One Touch streaming and recording

The One Touch feature lets you control both streaming and recording at the same time with the press of a single button. Once enabled, simply press either the Stream control key or the Record control key on the front panel of Pearl Nano to start/stop streaming and recording the channel.

The Record control key glows solid white when an SD card (or SATA M.2 2280 SSD) is installed and the Stream control key glows solid white if there are streams configured for the channel.



The colors of the control keys change when the channel is actively streaming and recording. A flashing control key means there's a problem with the settings for that particular function and the stream (or the recording) did not start.



You can enable and disable One Touch control using the Admin panel when you select **Configuration > Front screen** or using the front screen menu when you select **System > Controls**. See [Enable One Touch control](#) for details.

The following table describes the One Touch control state changes when you press the Record and Stream buttons on the front panel of Pearl Nano.

Table 9 Button control when One Touch streaming and recording is enabled

Condition	Button action	Result
Streaming and recording are Off.	Press Stream or Record .	Streaming and recording starts.
Streaming and recording are On.	Press Stream or Record .	Streaming and recording stops.
Streaming is started using the Admin panel and recording is Off.	Press Stream .	Streaming stops.
Streaming is started using the Admin	Press Record .	Recording starts and streaming

Condition	Button action	Result
panel and recording is Off.		continues.
Recording is started using the Admin panel and streaming is Off.	Press Stream .	Streaming starts and recording continues.
Recording is started using the Admin panel and streaming is Off.	Press Record .	Recording stops.
While streaming and recording are On, stop recording using the Admin panel.	Press Record .	Recording restarts and streaming continues.
While streaming and recording are On, stop streaming using the Admin panel.	Press Record .	Recording stops (the stream remains stopped)
While streaming and recording are On, stop streaming using the Admin panel.	Press Stream .	Streaming restarts and recording continues.

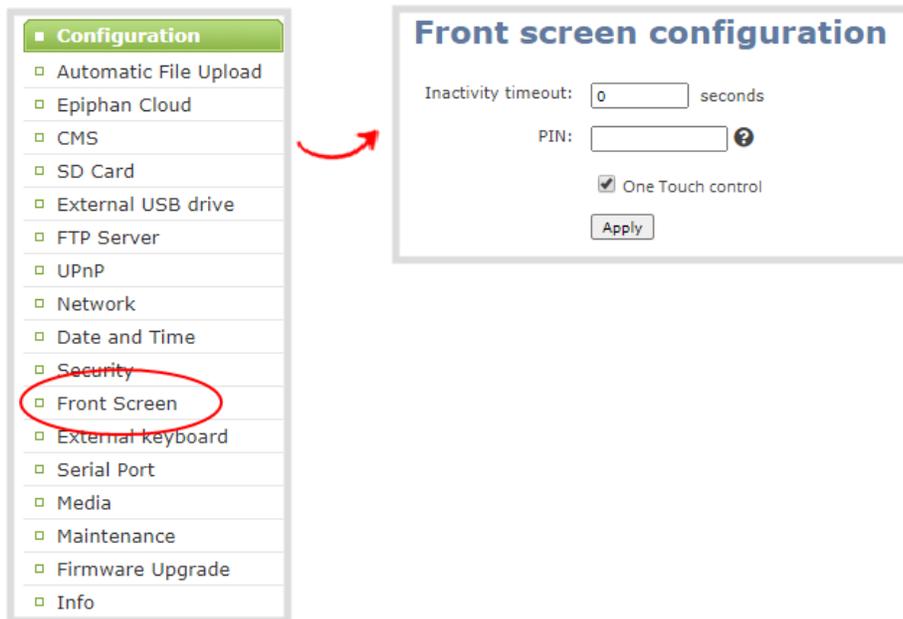
A storage medium must be installed in Pearl Nano before you can record any content using One Touch control and streaming destinations must already be configured for the channel. For details, see [SD card and SATA M.2 2280 SSD storage](#) and [Streaming to servers, CDNs, and other devices](#).

Enable One Touch control

One Touch streaming and recording control is disabled by default. You can enable and disable One Touch control using the Admin panel or from the front screen menu on Pearl Nano.

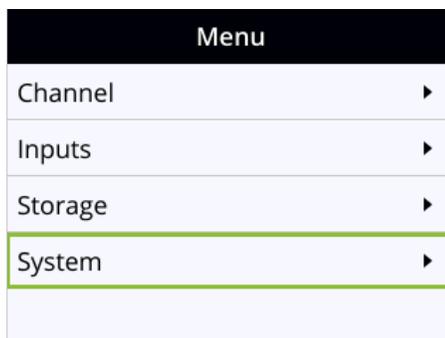
Enable or disable One Touch control using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Front screen**. The Front screen configuration page opens.
3. Check **One Touch control** and click **Apply**.

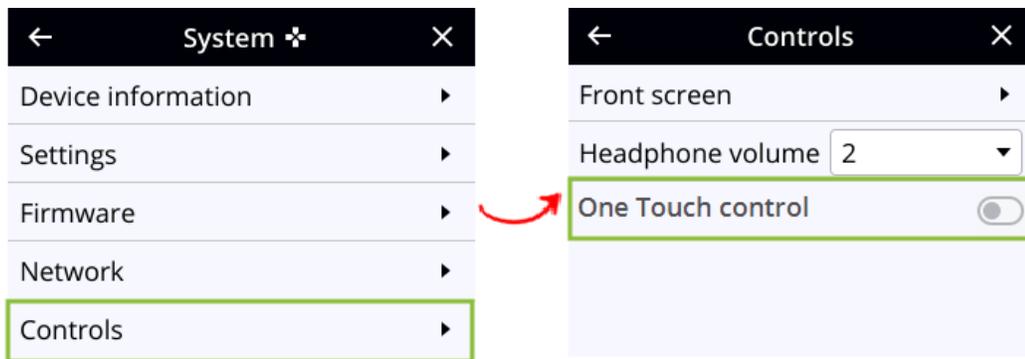


Enable One Touch control using the front screen menu

1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Controls** to open the Controls screen.



3. From the Controls screen, use the arrow keys to highlight **One Touch control** and press the **check mark** key to toggle the switch on or off.

The Admin panel

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

Topics include:

- [About the Admin panel](#)
- [Connect to the Admin panel](#)
- [Enable local console access to the Admin panel](#)
- [Connect using a DNS-based service discovery](#)
- [Connect using persistent static IP address](#)

For information about remote access to the cloud version of the Admin panel, see [Remote login to the Admin panel and Epiphan Live](#).

For information about integrating Pearl Nano with Content Management Systems (CMSs) and related administrator tasks, see [Integration](#).

About the Admin panel

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

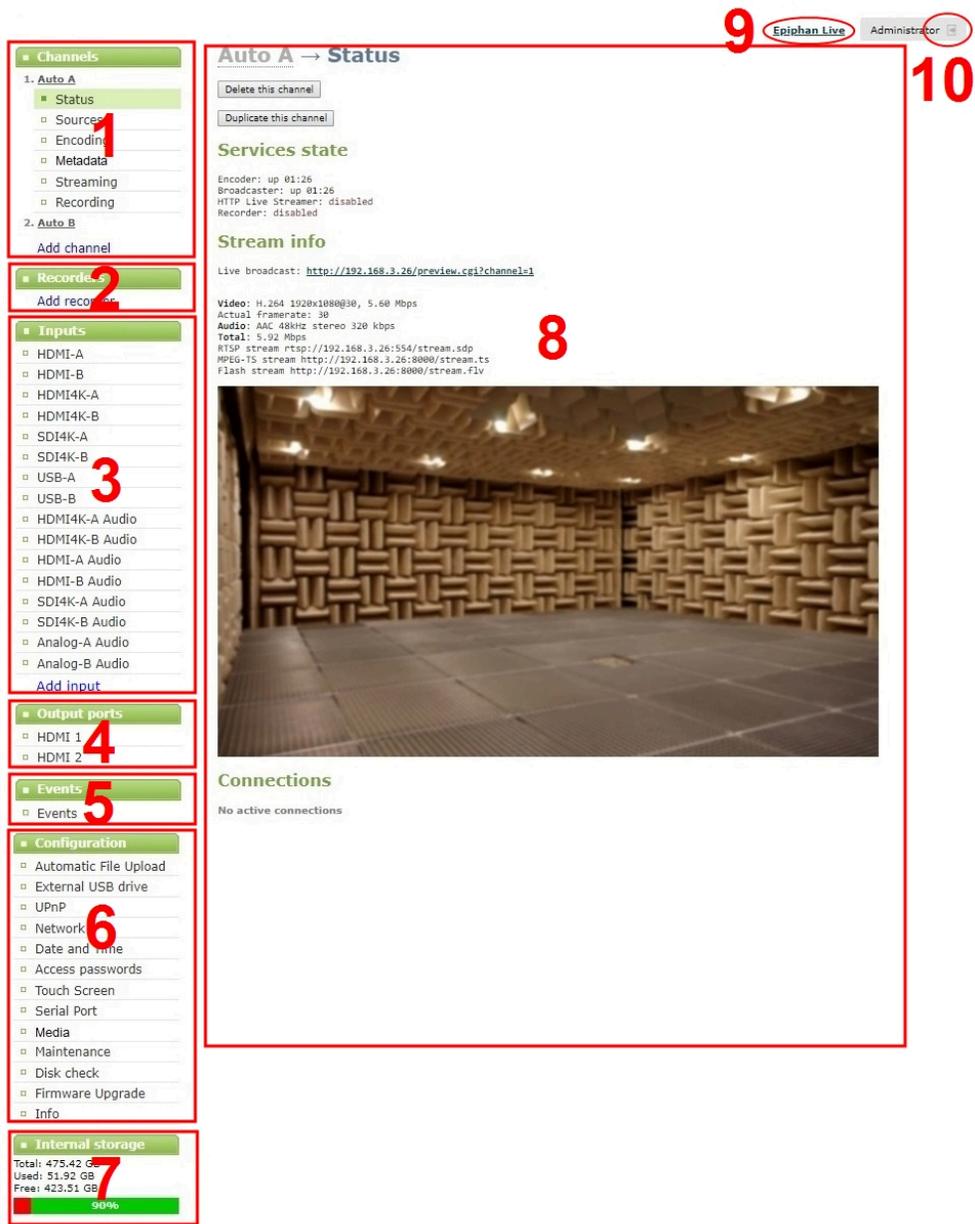


Table 10 The Admin panel

Label	Name	Description
1	Channels menu (Channel menu on Pearl Nano)	The channels that are available for the current configuration of your Pearl device are listed. Select a channel to access the drop down list of options that are available to configure channel encoding, add video and audio sources, create layouts, perform confidence monitoring, record the channel, and more.

Label	Name	Description
		 The Pearl Nano has a single channel.
2	Multitrack recorders menu (Pearl Mini, Pearl-2 and Pearl Nexus only)	Recorders you add to your Pearl device are listed. Select a recorder to open the status page and list of related recordings for that recorder. You can start and stop recording, as well as configure the recorder settings from this page.
3	Inputs menu	The available video and audio input ports on your Pearl device are listed. Select a port to open the configuration and status page for that port.
4	Output ports menu	The output ports available on your Pearl device are listed. Select a port to open the configuration and status page for that port.
5	Events menu	Access the Content Management System (CMS) events list containing up to three months of scheduled CMS events, in progress events, and completed ah hoc and scheduled events.
6	Configuration menu	A list of all the available configuration options.
7	Internal storage and system information menu	System details are displayed in this area, such as the total amount of internal storage, how much space is currently used, and how much free space is available.
8	Main panel	The main panel is where the selected menu information displays. What's displayed depends on which menu item you select.
9	Link to Epiphan Live (Pearl-2, Pearl Mini, and Pearl Nexus only)	Click to open Epiphan Live in a new tab.
10	Log out	Click to log out of the Pearl admin panel. Click icon again to display the log in window. The role of the currently logged in user displays beside the icon.

You can access the Admin panel using these methods:

- Any web browser, see [Connect to the Admin panel](#).
- Using a connected USB mouse, keyboard, and monitor, see [Enable local console access to the Admin panel](#).
- Remotely using Epiphan Edge, see [Remote login to the Admin panel and Epiphan Live](#).

Connect to the Admin panel

You can access the Admin panel several ways. The most common way is using an internet browser on a computer or tablet that's connected to the same local Ethernet network as Pearl device. All you need is the IP address of the device, which you can get from the settings using the Pearl device's front screen.

Another way to access the Admin panel is to remotely login over the Internet. An Epiphan Edge premium plan is required for remote login, see [Remote login to the Admin panel and Epiphan Live](#).

Get the IP address of Pearl Nano

To get the IP address of Pearl Nano, press the **left arrow** key repeatedly on the control key interface until the **System status** screen displays.

System status	
IP address	10.113.1.101
Firmware	4.14.0i
Uptime	07:22
CPU load	9%
SD card	111 GB of 111 GB
USB storage	Not detected

 You can also find the IP address of Pearl Nano from the front screen menu when you select **System > Network**.

Access the Pearl Admin panel

1. When you have the IP address of the Pearl device, enter the URL for your Pearl device into a web browser and include **/admin** to access the Admin panel.

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

 If HTTPS is enabled on the Pearl device, replace *http* with *https* in the URL.

2. When prompted, log in using the default user name **admin** and the administrator account password, then click **OK**. If you don't know the password, contact your Pearl system administrator.



For a first-time log in as an administrator-level user, you're prompted to assign passwords to the **admin**, **operator**, and **viewer** accounts. Record the passwords for future reference.

Optionally, you can connect to your Pearl device using the following methods:

- For networks with DHCP, you can [Connect using a DNS-based service discovery](#).
- For networks without DHCP, you can [Connect using persistent static IP address](#).

Enable local console access to the Admin panel

Operators and administrators can access the Admin panel locally to reconfigure the Pearl device without needing a laptop. With the local console feature, you can connect a USB mouse, keyboard, and a monitor directly to Pearl device. Or you can connect a touch screen monitor. The Pearl Nano also supports connection of a USB wireless RF receiver for local console. Pearl Nano also supports the connection of a USB hub.

A built-in virtual keyboard is readily available, but you can also connect an external USB keyboard. When you enable local console, you must also enable the **External keyboard** option.

Use the Admin panel or the Pearl device screen to enable local console and the external USB keyboard. Once enabled, simply connect your USB mouse, USB keyboard, and an HDMI monitor to the HDMI OUT port that has local console enabled. You cannot use the HDMI pass-through port for local console.

Optionally, you can disable whether or not users must login to the Admin panel when they access the local console. Login is enabled by default.

You can also change the layout of the built-in and external keyboards to any of the supported languages. If you select multiple languages, you can toggle between languages using Ctrl+Shift (or Ctrl+Alt).

- American English
- Dutch
- French
- German
- Italian
- Netherlands
- Portuguese (European)
- Spanish (Spain)

- Swiss
- Norwegian (Bokmal)
- Russian

Important considerations

- The live preview link is not accessible from the Channel Status page using the local console.
- Viewing recordings from the Recording section of a Channel is not possible.
- You cannot upload/download the following types of media using the local console:
 - Images
 - Channel recordings
 - EDID files
 - Configuration files
 - Firmware update files



Use the web-based Admin panel from your administration computer for full access to all Admin panel functions.

Enable local console and the external keyboard option using the Admin panel

1. Login to the Admin panel as **admin**, see [Enable local console access to the Admin panel](#).
2. From the Configuration menu, select **External keyboard**. The External keyboard configuration page opens.
3. Select **Local console** as the Keyboard application and click **Apply**.
4. (Optional) Check a different keyboard language layout or multiple language layouts. The default layout is American English.
5. (Optional) Choose the keyboard key combination to toggle between keyboard layouts if multiple languages are selected: **Ctrl+Shift** or **Alt+Shift**.
6. From the Output ports menu, select the output port (**HDMI**). The video output port configuration page opens.
7. Under Settings, select **Local console** in the Source drop-down menu and click **Apply**.

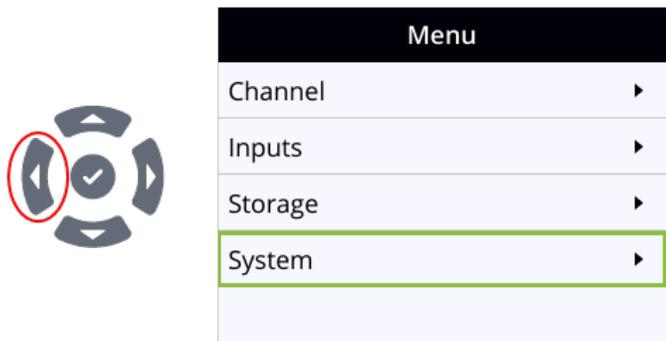
If you skipped the steps to configure the external keyboard for local console, an error message appears. Click the link to fix it.

8. (Optional) Check **Disable authentication** if you don't want users to have to use their credentials to log in before using the local console to access the Admin panel on the Pearl device.

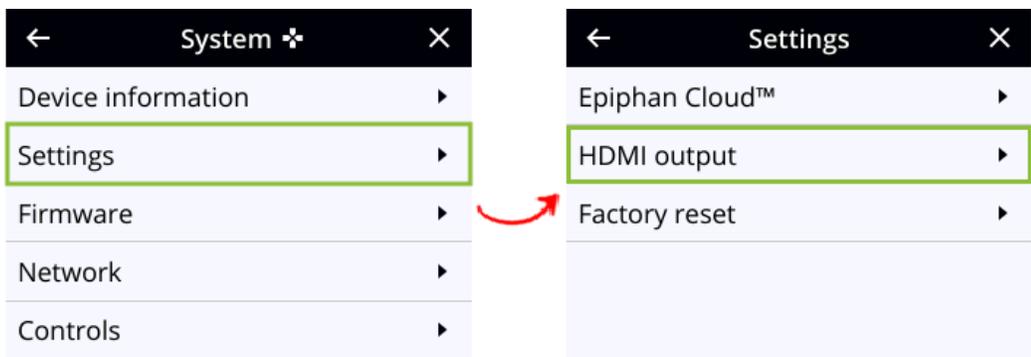
- 9. Under Settings, select **Local console** in the Source drop-down menu.
- 10. Click **Apply**.

Enable local console using the front screen menu

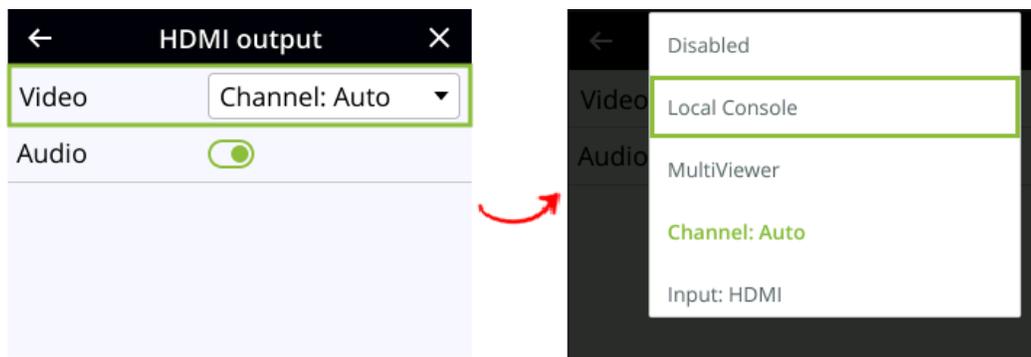
- 1. Press the **left arrow** key repeatedly on the control interface until the Menu screen displays.



- 2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Settings** to open the Settings screen.



- 3. From the Settings screen, select **HDMI output** to open the HDMI output screen, then press the **check mark** key to select Video and display the available video sources.



4. Highlight the video source you want, then press the **check mark** key to select and return to the previous screen. To return to the previous screen without making a selection, press the **left arrow** key.

What's next?

Connect your USB mouse, keyboard, and connect an HDMI monitor to the output port that has local console enabled to access the local console directly from the Pearl device.

Connect using a DNS-based service discovery

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

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

Table 11 Install 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/DL999 2. Click Download. 3. Follow the system prompts to download and install the application.
Mac OS X	The Bonjour software used for service discovery is built into the Mac OS. No special actions are needed.
Linux	The Avahi implementation used for DNS-based discovery is shipped with most Linux distributions. If necessary, check with your administrator to ensure you have the Avahi package installed.

Access the Admin panel of the Pearl device using DNS discovery

1. Find the system's serial number that's printed on a label attached to the device. To find the system serial number using the device screen, do the following:
 - **Pearl Nano:** Use the arrow keys and check mark to navigate the front screen menu and select **System > Device information**.
2. Enter the following string into the address bar of your web browser on your admin computer, where *<serial>* is the serial number of your Pearl device:

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

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



If HTTPS is enabled on the Pearl device, replace *http* with *https* in the URL.

3. Log in as an administrator using the default user name **admin** and the administrator account password, then click **OK** to open the Admin panel. If you don't know the password, contact your Pearl system administrator.



For a first-time log in as an administrator-level user, you're prompted to assign passwords to the **admin**, **operator**, and **viewer** accounts. Record the passwords for future reference.

4. (Optional) From the Configuration menu, click **Network** and note the **IP address** of the system from the network configuration page.

Connect using persistent static IP address

Your Pearl device has a default persistent static IP address, also known as the **recovery IP address**. To set up a Pearl device on a network that does not support DHCP, or to recover from a previous static IP address setting, use this procedure to connect directly to the device for configuration.

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

Pearl device static IP address defaults are:

- **IP Address:** 192.168.255.250
- **Netmask:** 255.255.255.252
- **Username:** admin
- **Password:** your admin password (by default there is no password assigned)

Access the Admin panel using the persistent static IP address

1. Establish an Ethernet connection between Pearl device and the workstation using one of the following methods:
 - a. Connect the Pearl device to a local Ethernet network shared with the workstation.
 - b. Connect the Pearl device directly to the workstation's Ethernet port using either a regular or a crossover Ethernet cable.
2. Record the network settings of the workstation that are used to connect to the Pearl device so that they can be restored later.
3. Temporarily change the network configuration on the workstation to the following:
 - Use Static IP assignment
 - IP address: 192.168.255.249
 - Subnet mask: 255.255.255.252
4. Start a web browser on the workstation and go to: **http://192.168.255.250/admin/**



If HTTPS is enabled on the Pearl device, replace *http* with *https* in the URL.

5. Log in as an administrator using the default user name **admin** and the administrator account password, then click **OK** to open the Admin panel. If you don't know the password, contact your Pearl system administrator.



For a first-time log in as an administrator-level user, you're prompted to assign passwords to the **admin**, **operator**, and **viewer** accounts. Record the passwords for future reference.

6. From the Configuration menu, click **Networking**.
7. Click **use a static address** and enter a static IP address and network settings you want for the Pearl device. For more information, see [Configure network settings](#).
8. Restore the previously saved network configurations on the workstation.

Cloud-based device management

Epiphan Edge is where remote teams can conveniently manage and control all Pearl systems together in one place. An Internet connection and a free Epiphan Cloud account is all you need to get started.

When Pearl Nano is paired with your Epiphan Cloud account, you can start/stop video recording and streaming, monitor the health of Pearl Nano with status alerts and a diagnostics dashboard, monitor video feeds, update firmware remotely, and even remotely configure channel encoding. Epiphan Cloud accounts also support Single Sign-On (SSO) through the SAML 2.0 protocol. See: [Configuring Single Sign-On \(SSO\)](#).

Topics include:

- [About Epiphan Edge](#)
- [Enable or disable Epiphan Edge access](#)
- [Pair and unpair from Epiphan Edge](#)
- [Remote login to the Admin panel and Epiphan Live](#)

For more information about Epiphan Edge, see the [Epiphan Edge User Guide](#).

About Epiphan Edge

Epiphan Edge is your remote management and control center for all your Pearl systems. All you need is a free Epiphan Cloud account.

After you pair your Pearl Nano with your Epiphan Cloud account, you can access your Pearl Nano from anywhere there's an Internet connection. You can even invite others to join your team for easy remote access.

Using Epiphan Edge you can:

- Preview video sources and audio.
- Start/stop channel recording and streaming remotely.
- Remotely configure channel encoding.
- Create live streams.
- Monitor performance statistics and system alerts 24/7.
- Set up custom email alerts.
- Set up remote teams and assign team members access and control levels.
- Perform updates and batch operations for efficient fleet management.
- Remotely log in to cloud versions of the Admin panel for remote rescue troubleshooting, full administration access, and to control recording and streaming using the Admin panel.
- Schedule the start time, end time and date for your Pearl system to record and/or stream.

For more information about Epiphan Edge features and functions, see the online [Epiphan Edge User Guide](#).

Important considerations

- The following actions cause the entry for a Pearl system in Epiphan Edge to permanently go offline. You must pair the Pearl system again to remotely control, monitor, or configure it using Epiphan Edge.
 - Unpairing Pearl systems in Epiphan Edge.
 - Using the Admin panel to disable the Epiphan Edge feature on a Pearl system while the device is paired to Epiphan Edge.
- If you pair a Pearl system again after you have successfully unpaired from Epiphan Edge, a new device instance is created in Epiphan Edge. The previous instance for the Pearl system remains permanently offline.
- Some features like batch operations and remote login require the Epiphan Edge Premium plan.

Enable or disable Epiphan Edge access

Epiphan Edge is where you go to remotely manage and control your Pearl Nano. Access is enabled on Pearl Nano by default. All you need to do is pair the Pearl Nano to your free Epiphan Edge account for access to your device over the Internet. You can disable Epiphan Edge access on your Pearl Nano from the device screen or using the Admin panel and enable it again later. Access is enabled by default.

Important considerations

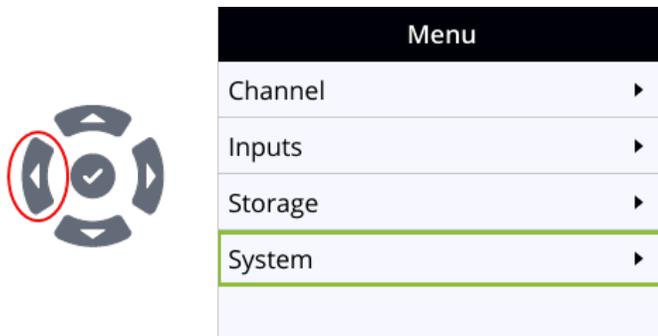
- Unpair the Pearl device from Epiphan Edge before disabling Epiphan Cloud access on the Pearl device using the Admin panel.
- If you disable Epiphan Edge access while the Pearl device is paired, the device instance in Epiphan Edge goes permanently offline. For more information, see [Pair and unpair from Epiphan Edge](#).

Enable or disable Epiphan Edge access using the Admin panel

1. Log in as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Maintenance**. The Maintenance page opens.
3. Uncheck **Enable Epiphan Edge** to disable the feature or leave it checked to allow the Pearl device to access Epiphan Edge. Click **Apply** to save your changes.

Enable or disable Epiphan Edge access using the front screen menu on Pearl Nano

1. Press the **left arrow** key repeatedly on the control interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Settings** to open the Settings screen.
3. From the Settings screen, select **Epiphan Edge** to open the Epiphan Edge screen.
4. Highlight **Enable Epiphan Edge** and press the **check mark** key to toggle the switch on or off.

Pair and unpair from Epiphan Edge

To manage your Pearl Nano from the cloud or access the Admin login feature, the Pearl Nano must be paired to your Epiphan Cloud account.

Easily pair the Pearl Nano directly from the Admin panel or add the Pearl Nano as a new device in Epiphan Edge using its device ID pairing code. To manually pair a Pearl Nano in Epiphan Edge using the device's pairing code, see the [Epiphan Edge online user guide](#).

You can unpair from Epiphan Edge using the Admin panel or directly within Epiphan Edge. Each time you unpair the Pearl Nano, the device ID pairing code changes value. When you pair the Pearl Nano again, a new instance of the Pearl Nano with a different device ID is created in Epiphan Edge.



If you unpair from Epiphan Edge using the Admin panel, the Pearl Nano's status in Epiphan Edge only changes to the offline state. To completely unpair the Pearl Nano from Epiphan Edge, you must use Epiphan Edge to unpair your Pearl Nano.

Important considerations

- The Pearl Nano's entry in Epiphan Edge permanently goes offline when you unpair. You must pair the Pearl Nano again to use Epiphan Edge to remotely manage or log in to the Pearl Nano.
- If you pair the Pearl device again after you have successfully unpaired from Epiphan Edge, a new device instance is created in Epiphan Edge. The previous instance for the Pearl device remains permanently offline, which you can delete at any time.



You can still access information about permanently offline device instances in Epiphan Edge.

Pair and unpair Pearl Nano using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Epiphan Edge**. The Epiphan Edge status page opens. The pairing code device ID for the Pearl device is shown, as well as a link to pair the device.
3. Select **Click to pair**. The Epiphan Cloud login page opens in a new tab (<https://go.epiphan.cloud>)
4. Log in to your existing Epiphan Cloud account or sign up for a free account.
5. After you've logged in to Epiphan Cloud, your Pearl device automatically pairs to your default Epiphan Cloud team and the Device Details page opens in Epiphan Edge. If you have multiple teams associated with your account, you're prompted to select a team.
6. In the Admin panel, the status of the Pearl device updates to **paired** on the Epiphan Edge status page.
7. To unpair a Pearl device using the Admin panel, select **Unpair** on the Epiphan Edge status page.

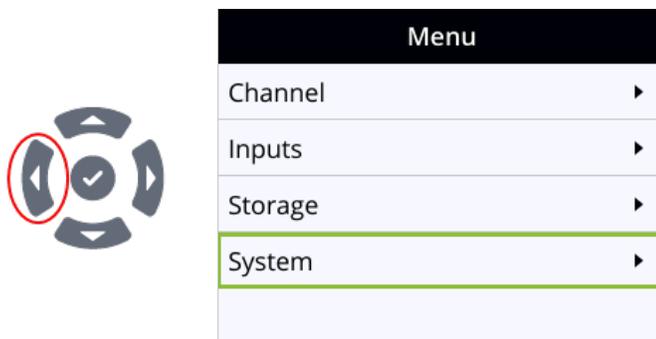
Automatic Pairing Pearl device using a USB Stick

1. start by formatting a USB stick to with either FAT, exFAT, ext2 or ext4
2. Insert the USB into your computer
3. Change the USB drive label to '**EPIPHAN**'. In majority of operating systems, this is usually performed by right clicking on the USB drive and select the rename option
4. Create a folder called 'EPIPHAN' as a top level folder.
5. Log into your Epiphan cloud account and choose the team you'd like to pair your Pearl Nexus to in this case
6. In top right hand corner of the page, click pair device button

7. Next click the Get pairing file button
8. This will download a file to your computer
9. Move or copy this file to the EPIPHAN folder on the USB stick.
10. Eject the USB stick from your computer
11. Insert the USB stick to USB port on an Internet connected Pearl and wait a few seconds for the Pearl to pair with your Epiphan Edge team.
12. Successful pairing can be verified from Pearl device front screen .

Get the pairing code for Pearl Nano using the front screen menu

1. Press the **left arrow** key repeatedly on the control interface until the front screen menu displays.



2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Settings** to open the Settings screen.
3. From the Settings screen, select **Epiphan Edge** to open the Epiphan Edge screen.
 - a. If the Pearl device is not currently paired to Epiphan Edge, the pairing code displays on screen.
 - b. If the Pearl device is paired to Epiphan Edge, the screen changes to show the name of the team the device is paired to and the name assigned to the paired device.

Remote login to the Admin panel and Epiphan Live

You can remotely log in to the Pearl device for full administration access to configure and operate the Pearl device over the Internet using a cloud version of the Admin panel and Epiphan Live. You just need to pair the Pearl device to an Epiphan Cloud account that has a Premium plan.



Epiphan Live is not available for Pearl Nano.

With an Epiphan Edge Premium plan, full administrative access to your Pearl device for setup and rescue troubleshooting is fast and convenient. The cloud version of the Admin panel uses the same login credentials as the locally accessed web version.



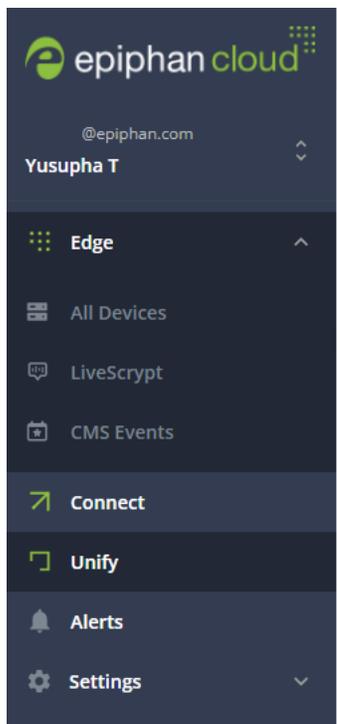
The URL of the local web version of the Admin panel is not the same as the URL of the cloud version. An Epiphan Edge Premium plan is only required to access the cloud version.

Before you begin

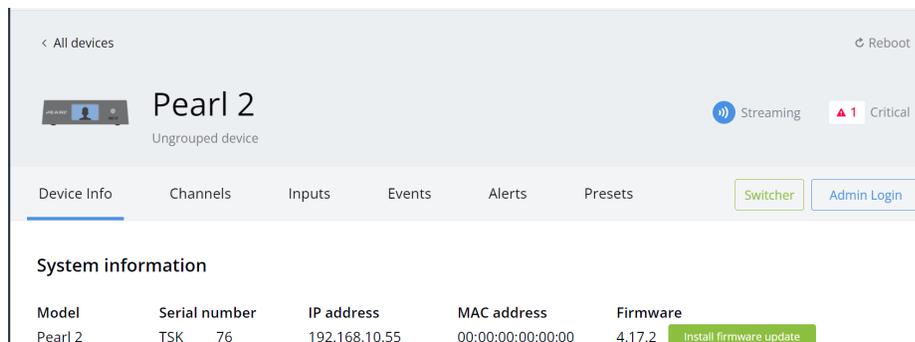
- Make sure the Pearl device is paired to your Epiphan Edge account, see [Pair and unpair from Epiphan Edge](#).
- Upgrade to an Epiphan Edge Premium plan.

Access the cloud version of the Admin panel

1. Log in to your Epiphan Edge account at <https://go.epiphan.cloud>
2. In the left navigation pane, click **Edge > All Devices** to open the All Devices page.



3. Click the device name in the list to open the details page for that device.
4. From the Device Details page, click **Admin login** in the header bar. A new tab with the cloud Admin panel login opens in your browser.



See [The Admin panel](#) for instructions to use the interface or to access the local web version.

Schedule start and stop times to record and stream

You can now use Epiphan Edge to schedule start and stop times for when Pearl Nano to record and/or stream. You just need to pair the Pearl Nano to an Epiphan Cloud account that has a Premium Epiphan Edge plan. Then configure the Pearl Nano to retrieve schedules from Epiphan Edge.

When a schedule is created for a Pearl Nano, it will download the schedule to its local database and follow the schedule to start or stop recording and streaming as needed. Where recorded files are stored are determined by how the Pearl Nano is configured at scheduled start time of recording. For example, if the Pearl Nano is configured to use its AFU feature to transfer recorded files to a USB drive, at the end of a scheduled recording, all files recorded as part of this scheduled recording will be automatically uploaded to the USB drive.

Before you begin

- Make sure the Pearl device is paired to your Epiphan Edge account, see [Pair and unpair from Epiphan Edge](#).
- Upgrade to an Epiphan Edge Premium plan.

Enable scheduling using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. From the **Choose CMS** drop down, select **Epiphan Edge** and then click **Apply**.
4. Log in to your Epiphan Edge account at <https://go.epiphan.cloud>
5. In the left navigation pane, click **Edge > All Devices** to open the All Devices page.

6. Click the device name in the list to open the details page for that device.
7. From the Device Details page, click **Events** in the header bar.
8. Click the **+ Add event** button to schedule a recording and/or streaming for this device.

Configure network settings

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

Topics include:

- [Network ports used by Pearl Nano](#)
- [Verify IP address and MAC address](#)
- [Configure a static IP address](#)
- [Configure DHCP](#)
- [Configure DHCP Option 81](#)
- [Configure Dynamic DNS](#)
- [Change the HTTP/HTTPS port values](#)
- [Perform network diagnostics](#)

To monitor network status information, see [View network status](#).

To set up traffic shaping for multicast streams, see [Set up traffic shaping](#).

Network ports used by Pearl Nano

The following table lists the default incoming and outgoing network ports.

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

Table 12 Default incoming network ports for Pearl Nano

Port (or range)	Protocol	Description
22	TCP	SSH for remote support. See Support .
80	TCP	HTTP/HTTPS for web-based access to the Admin panel and Epiphan Live, Legacy HTTP/HTTPS API, REST API, HLS streaming (if enabled) and the live channel preview. You can change the default HTTP port value using the Admin panel, see Configure HTTPS .

Port (or range)	Protocol	Description
123	TCP/UDP	NTP server, if enabled. See Configure a time server .
319 and 320	UDP	PTP server, if enabled. See Configure a time server .
443	TCP	<p>HTTPS for the Admin panel and HLS streaming if enabled. Port is open only when HTTPS is enabled. You can change the default HTTPS port value using the Admin panel, see Configure HTTPS.</p> <p>Checks for new firmware versions are over this port, as well as downloading firmware files.</p>
Pearl Mini, Pearl Nexus, and Pearl-2: 554 to 554+(x-1) Pearl Nano: 554	TCP	<p>For RTSP/TCP and RTSP/HTTP streaming on your network (where x is the number of channels configured). The number of ports used depends on how many channels you have with RTSP streaming enabled. See Share a live broadcast stream (HTTP, HTTPS, or RTSP). Note that client video players choose whether they are using RTSP/TCP, RTSP/HTTP or RTSP/UDP.</p> <p>Port 554 (and port 555 for Pearl Mini, Pearl Nexus, and Pearl-2) is also used for internal communications. If streaming is disabled, these ports remain open but refuse all external connection requests.</p>
Random in range 32768 - 61000	UDP	If the client video player chooses RTSP/UDP, it will negotiate 4 random UDP ports (two for audio and two for video). The port range is dependent on the OS of the client video player and can change with updates to that OS.
5353	UDP	For multicast DNS discovery. See Connect using a DNS-based service discovery .
Pearl Mini, Pearl Nexus, and Pearl-2: 8000 to 8000+(x-1) Pearl Nano: 8000	TCP	<p>For Flash (FLV) live stream and MPEG-TS streaming on your network (where x is the number of channels configured). The number of ports used depends on how many channels you have with streaming enabled. See Share a live broadcast stream (HTTP, HTTPS, or RTSP).</p> <p>Port 8000 (and port 8001 for Pearl Mini, Pearl Nexus, and Pearl-2) is also used for internal communications. If streaming is disabled for the channel from Channel > Streaming using the Admin panel, these ports remain open but refuse all external connection requests.</p>

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

- **Port 443** - used for firmware update checks and downloads.
- **Publishing/streaming port** - the actual ports used for streaming to a server depends on the server and protocol used. See [Streaming to servers, CDNs, and other devices](#).
- **AFU file recording transfer port** - the actual ports used for AFU depends on your configuration. See [Automatic file transfers](#).

Fully Qualified Domain Name (FQDN) Considerations

Some of Epiphan’s services are run on servers and depending on your network/firewall settings, your network/IT team may need to know the FQDN (fully qualified domain name) of such services for them to work properly connecting via your network. You can find a list below,

- **Epiphan Cloud:**
 - EU Region: eu.epiphan.cloud
 - US Region: go.epiphan.cloud
- **Epiphan Remote Login Server:** support.md.epiphan.cloud
- **Firmware/Registration Server:** updates.epiphan.com
- **License Upgrades:** licenses.epiphan.com

Verify IP address and MAC address

To view the current IP address and MAC address of the Pearl device:

- From the Network configuration page using the Admin panel.
- For Pearl Nano, select **System > Network** on the front screen. You can also see the IP address when you navigate to the System status screen using the front panel control interface.

Table 13 Network Information

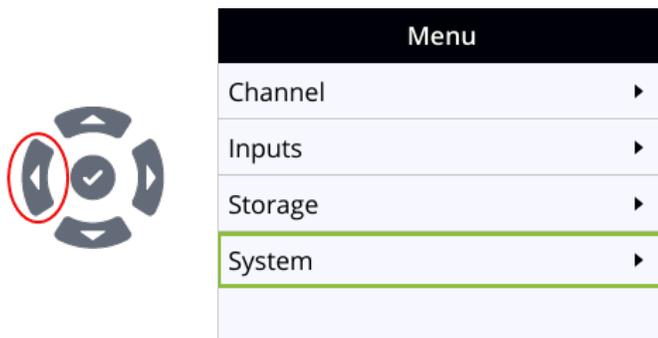
Item	Description/Options
MAC Address	A media access control address (MAC address) is a unique identifier for the network interface. The value is read-only and cannot be changed. You may need to share this value with your system administrator.
IP Address	Shows the current internet protocol address (IP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

View network information using the Admin panel

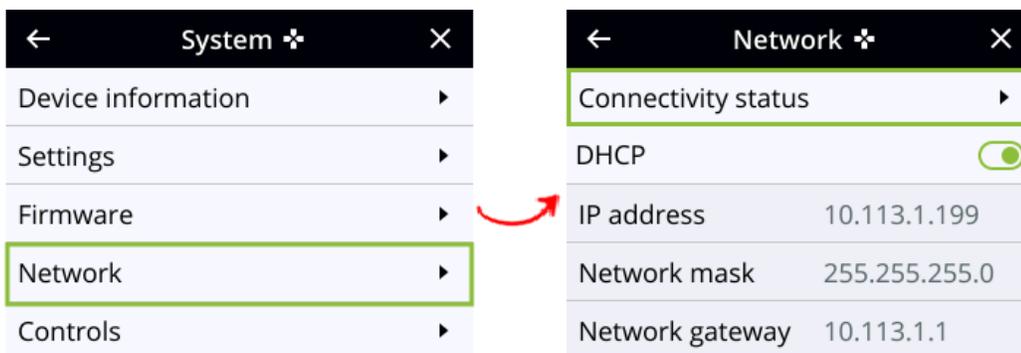
1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Network** and select the Interfaces tab. The Interfaces page opens.

View network information using the front screen menu on Pearl Nano

1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Network** to open the Network screen.



3. From the Network screen, use the arrow keys to scroll down the list to see all the network parameters, like the MAC address.

Configure a static IP address

You can use the following methods to configure Pearl Nano to use a static IP address:

- From the Interfaces tab of the Network configuration page using the Admin panel.
- Applying a Configuration Preset where the Network settings use a static IP address.
- From the front screen menu when you select **System > Network**. You can also see the IP address when you navigate to the System status screen using the front panel control interface.

TIP: Using the device screen, you can choose to apply a configuration preset that contains a static network IP. See: [Apply a configuration preset using the front screen menu](#).



Only IPv4 addresses are supported. Pearl Nano does not support IPv6.

Configure a static IP address using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Network** and the **Interfaces** tab. The Network Interfaces page opens.
3. For an interface, toggle the **Use DHCP** switch and enter your networking information in to the required fields. Click **Save** when you're done.

Table 14 Static IP Address Fields

Label	Description
Use DHCP	Toggle the switch to choose between DHCP or static IP address configuration.
IP Address	The internet protocol address (IP Address) to assign. Obtain this from your network administrator. Pearl Nano supports IPv4 addresses. They do not support IPv6 addresses.
Network Mask	Also called the subnet mask, this value denotes a range of IP addresses. Obtain this from your network administrator, from another computer on the same subnet, or calculate the value using an online subnet calculator.
Default gateway	The network node that serves as an access point to the rest of the network. This value cannot be blank unless you are using DHCP. 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.

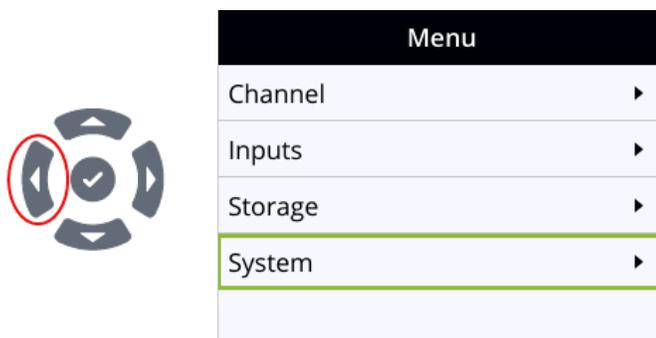
Label	Description
MTU Size	The maximum transmission unit (MTU) specifies the maximum packet size for transfer on the network. The default value is 1500, which is the largest value allowed by Ethernet at the network layer. It's best for all nodes in your network to use the same value. Only change the MTU value if you know that other nodes use a different value.

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

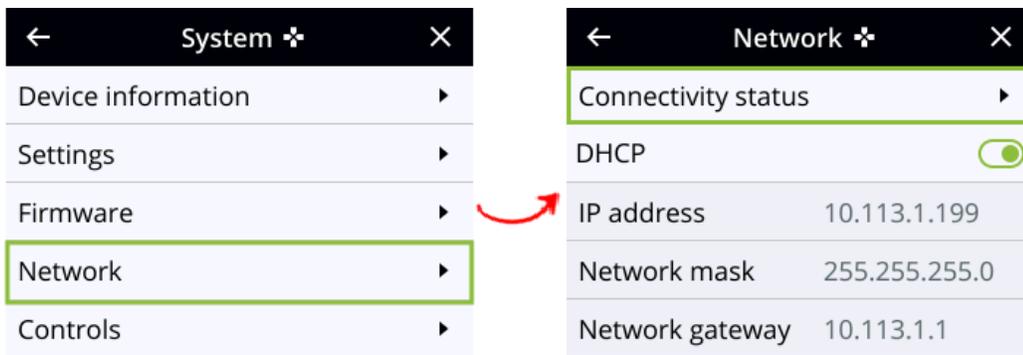
4. Reboot the Pearl device when prompted. From the Configuration menu, select **Maintenance** and click **Reboot Now** on the Maintenance page.
5. After the system has finished rebooting, use the new IP address to log back in to the Admin panel as **admin** and verify that all changes were applied.

Configure a static IP address using the front screen menu on Pearl Nano

1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



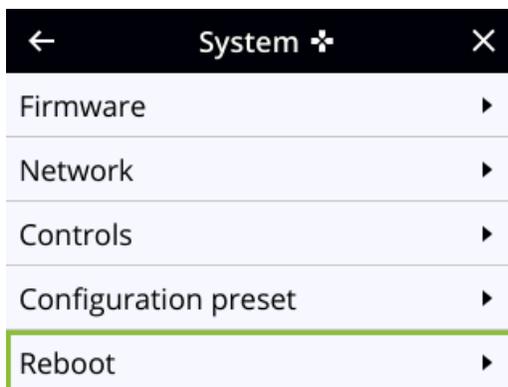
2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Network** to open the Network screen.



- From the Network screen, use the arrow keys to highlight **DHCP** and press the **check mark** key to toggle the switch off. The network addresses disappear from the screen.
- Use the arrow and check mark keys to select **IP address**. The screen to enter a static IP address opens.



- Use the arrow and check mark keys to enter a static IP address, then select **Set IP address**. If you leave the IP address screen without setting the IP address, the IP address you entered is not assigned to the Pearl device.
- Reboot the Pearl device to apply the network changes. Return to the System screen and use the down arrow key to scroll down until **Reboot** appears. Then select **Reboot** using the **check mark** key and select **Reboot now** when prompted.



Configure DHCP

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

- Restore factory settings, which clear all your custom settings. See [Perform a factory reset](#).
- Apply a configuration preset file that uses DHCP networking.
 - Using the admin panel, see: [Apply a configuration preset using the Admin panel](#).
 - Using the front screen, see: [Apply a configuration preset using the front screen menu](#).
- Change the network settings manually using either the device screen or the Admin panel.

Manually select DHCP as the network type using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Network**. The Network configuration page opens.
3. Choose **Yes** from the **Use DHCP** drop-down and change the **MTU Size** if needed, then click **Apply**.

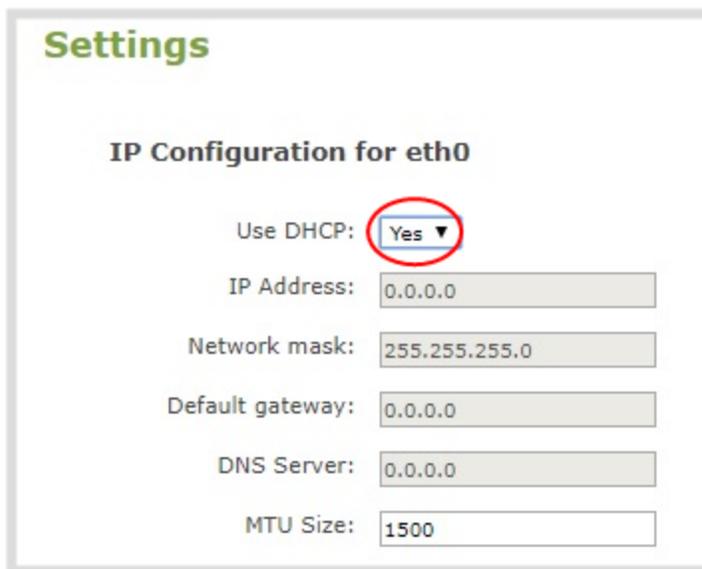


Table 15 DHCP Fields

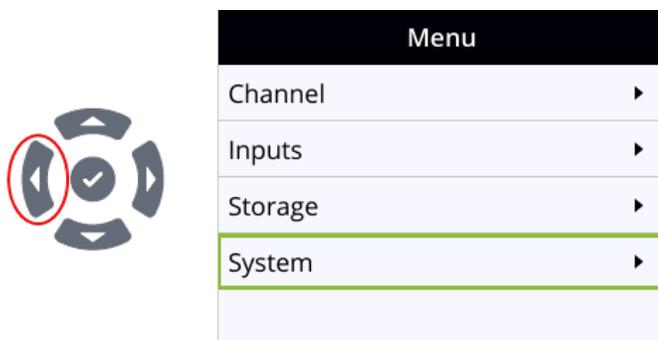
Label	Description/Options
Use DHCP	Select this option to dynamically obtain an IP address at boot up using DHCP
Use static address	Only select this option if you want to use the configured static IP address instead.

Label	Description/Options
MTU Size	The maximum transmission unit (MTU) specifies the maximum packet size for transfer on the network. The default value is 1500, which is the largest value allowed by Ethernet at the network layer. It's best for all nodes in your network to use the same value. Only change this value if you know that other nodes use a different value.

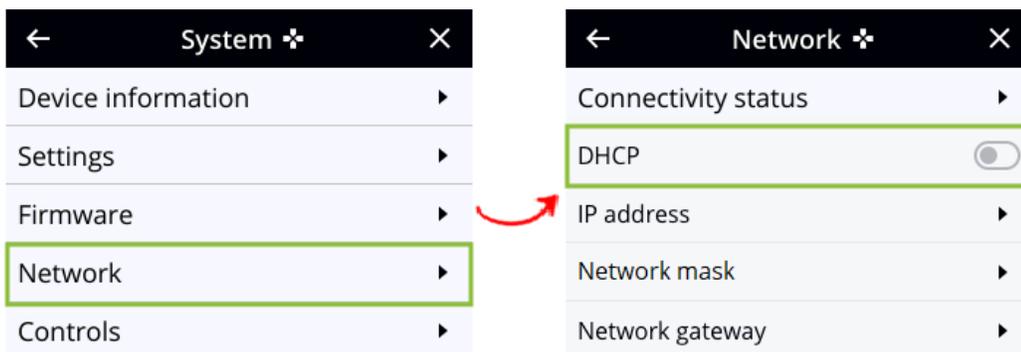
4. Reboot the Pearl device when prompted. From the Configuration menu, select **Maintenance** and click **Reboot Now** on the maintenance page.
5. After the system has finished rebooting, log back in to the Admin panel as **admin** and verify that all changes were applied.

Manually select DHCP as the network type using the front screen menu on Pearl Nano

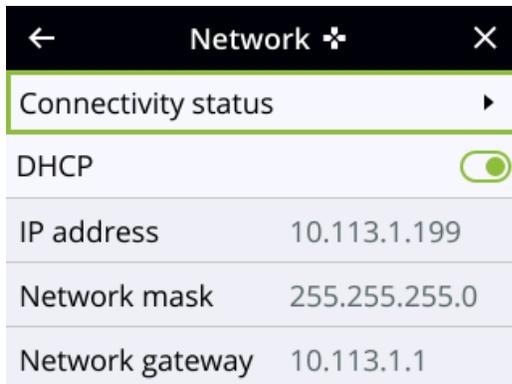
1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



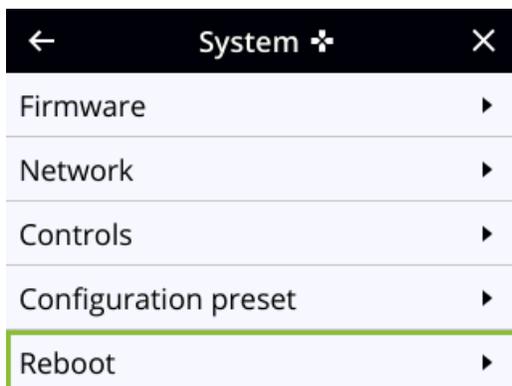
2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Network** to open the Network screen.



3. From the Network screen, use the arrow keys to highlight **DHCP** and press the **check mark** key to toggle the switch on. The DHCP acquired network addresses appear on the screen.



4. Reboot the Pearl device to apply the network changes. Return to the System screen and use the down arrow key to scroll down until Reboot appears. Then select **Reboot** using the **check mark** key and select **Reboot now** when prompted.



Configure DHCP Option 81

Ensure your Domain Name Server (DNS) always has the Pearl device's most up-to-date IP address mapped to the Pearl device's Fully Qualified Domain Name (FQDN). Option 81 support means you can keep using Pearl's FQDN no matter how many times the DHCP server may change Pearl's IP address. The Pearl Nano automatically asks the DHCP server to tell the Domain Name Server (DNS) to update the Pearl device's record with any changes to the Pearl device's IP address or FQDN. DHCP Option 81 is disabled by default.

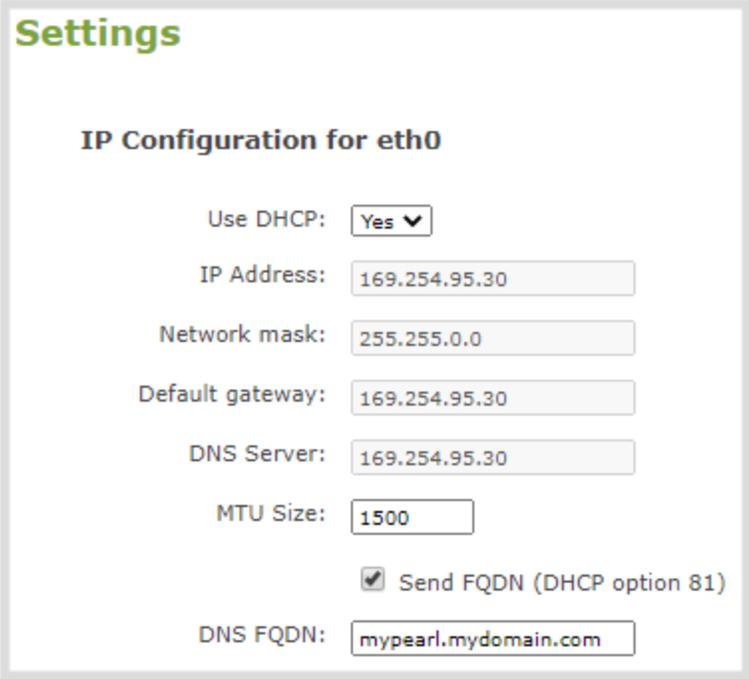
Important considerations

- The DHCP server must support Option 81 for this feature to work.
- DHCP should be enabled and setup before enabling DHCP Option 81, see [Configure DHCP](#).

- You need the FQDN of your Pearl system for this procedure. Consult your network administrator if you don't have that information.

Configure DHCP Option 81 using the Admin panel

- Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
- From the Configuration menu, select **Network**. The Network configuration page opens.
- Under Settings, check **Send FQDN (DHCP Option 81)**.



Settings

IP Configuration for eth0

Use DHCP:

IP Address:

Network mask:

Default gateway:

DNS Server:

MTU Size:

Send FQDN (DHCP option 81)

DNS FQDN:

- In the **DNS FQDN** field, enter the FQDN of your Pearl device, for example: *mypearl.mydomain.com*
- Click **Apply**.
- Reboot the Pearl device when prompted.
- After the system has finished rebooting, log back in to the Admin panel as **admin** and verify that all changes were applied.

Configure Dynamic DNS

You can use Dynamic Domain Name Server (DDNS) to ensure that whenever the DHCP server changes the Pearl device's IP address, the Pearl device informs the DDNS to update its domain name records. That way, you can keep using the Pearl device's FQDN without worry.

The DDNS feature is useful if your DHCP server doesn't support Option 81. Custom DDNS servers, dyndns.org, and noip.com are supported.

Table 16 DDNS Fields

Label	Description/Options
Provider	Choose if the DDNS provider is dyndns.com, noip.com, or a custom DDNS server of your choice.
DDNS server name	If you are using a custom DDNS provider, you must enter the DDNS server name. If dyndns.com or noip.com are used, you can leave this field blank.
DDNS server path	If you are using a custom DDNS provider, you must enter the DDNS server path. If dyndns.com or noip.com are used, you can leave this field blank.
Use SSL	Choose if you will use Secure Socket Layer (SSL) encryption for communications with the DDNS server. This is enabled by default.
Update period	Enter how often the Pearl device updates the DDNS server with the Pearl device's new IP address when the DHCP server changes it. Enter the update period in seconds from 30 to 864000 seconds (i.e. up to a maximum period of 10 days). The default is 600 seconds.
Username	Enter your user name for the DDNS provider.
Password	Enter your password for the DDNS provider.
Hostname	Enter the hostname to use for this Pearl device in the DDNS server records. Pearl device's serial number is the default hostname.
External IP detection server name	If your DDNS provider uses an external IP detection server, you must provide that server's name.
External IP detection server path	If your DDNS provider uses an external IP detection server, you must provide that server's path.
Use SSL for external IP detection	Choose if you will use SSL encryption for communications with the external IP detection. This is enabled by default.

The status of the connection to the DDNS server, the last external IP address of the Pearl device that was reported to the DDNS server, and the time when the IP address was reported is shown.

Configure DDNS using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Network** and then select the **Dynamic DNS** tab. The Dynamic DNS page opens.
3. Under Dynamic DNS, check **Enabled** and in the Provider field, choose either **Custom**, **dyndns.com**, or **noip.com** in the drop-down menu.
4. If you selected Custom as the provider, enter the **DDNS server name** and **DDNS server path**. If dyndns.com or noip.com were selected as the provider, you can leave those fields blank.
5. Enter the **Username** and **Password** for your DDNS server.
6. In the **Hostname** field, enter the hostname of your Pearl device, for example: *mypearl*. The default hostname is the serial number of the Pearl device.
7. If your DDNS provider uses an external IP detection server, enter the **External IP detection server name** and **External IP detection server path**.
8. Check **User SSL for external IP detection** if you want to use that feature with an external IP detection server.
9. (Optional) Change the **Update period** in seconds.
10. Click **Save**.
11. Reboot your Pearl device when prompted.
12. After the system has finished rebooting, log back in to the Admin panel as **admin** and verify that all changes were applied.

Change the HTTP/HTTPS port values

On the Pearl device, the default HTTP port is 80 and the default HTTPS port is 443. If the default ports used by your Pearl device are not available on your network, you can change them using the Admin panel. Consult your system administrator for the correct port values to use for HTTP and HTTPS traffic.



Ensure that the port value you choose is unique and is not currently assigned on the Pearl device, see [Network ports used by Pearl Nano](#).

Change the HTTP/HTTPS port values using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).

- From the Configuration menu, select **Security**. The Security configuration page opens.
- Under HTTPS configuration, change the default HTTP and HTTPS port numbers. Click **Apply** when you're done.

HTTPS configuration

Secure connection (HTTPS)

HTTP port: (HTTP redirects to HTTPS port when HTTPS is enabled)

HTTPS port:

Current Certificate: Built-in self-signed certificate

Certificate info: Issuer: O=Epiphan Video, Subject: O=Epiphan Video, From: 08/09/2016 To: 08/07/2026, Valid

New certificate: No file chosen

Private Key: No file chosen



Secure connection (HTTPS) must be checked before you can change the HTTPS port.

- Reboot the Pearl device when prompted. After the system has finished rebooting, log back in to the Admin panel as **admin** and verify that all changes were applied.

Perform network diagnostics

Network diagnostic tools are available to help you troubleshoot your setup. Easily run diagnostics like traceroute, ping, and others using the Admin panel. For quick troubleshooting, you can run the Connectivity status diagnostics using the front screen menu of the Pearl Nano. You can also run network diagnostics from Epiphan Edge, see the online [Epiphan Edge User Guide](#).

For more information about the network diagnostic tools and test results, see [Diagnostic tools](#).

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

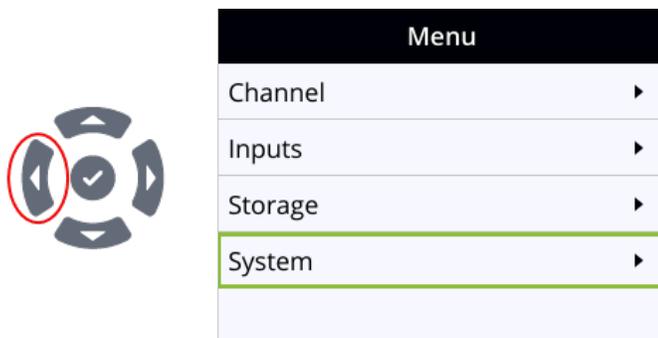
Perform network diagnostics using the Admin panel

- Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).

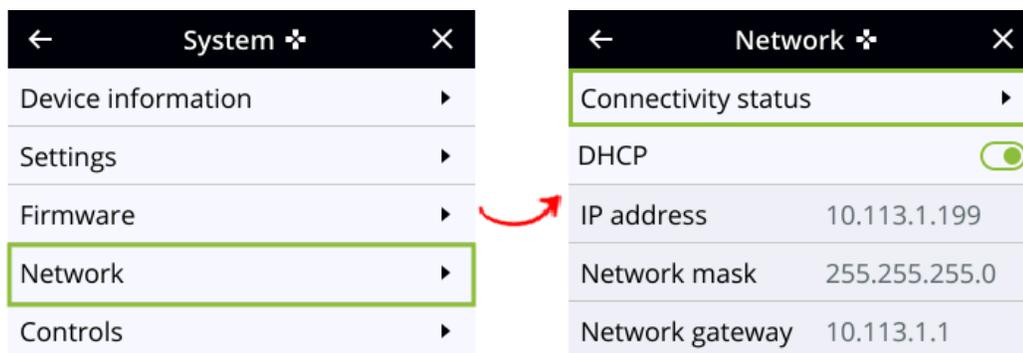
2. From the Configuration menu, select **Network** and then select the **Network Diagnostics** tab. The Network diagnostics page opens.
3. In the Network diagnostics section, choose a diagnostic test from the drop-down menu and select **Start**.

Perform connectivity status diagnostics using the front screen menu of Pearl Nano

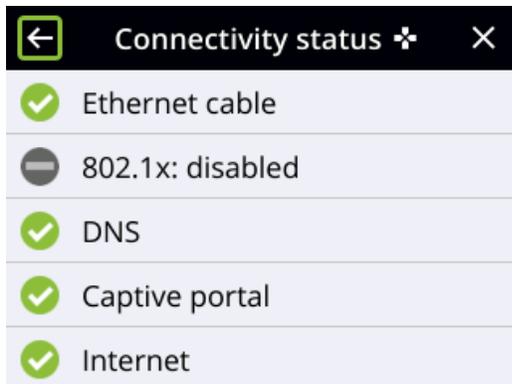
1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Network** to open the Network screen.



3. From the Network screen, press the **check mark** key to select Connectivity status and open the Connectivity status screen.
4. Use the arrow keys to scroll through the list of diagnostics results.



Disable the network discovery port

You can disable the network discovery port on the Pearl device using the Admin panel so that services can no longer discover the Pearl device systems using multicast DNS (mDNS). The network discovery port on the Pearl device is port 5557 and is enabled by default.

Important considerations

- You cannot connect to the Admin panel using a DNS-based service discovery if you disable the network discovery port, see [Connect using a DNS-based service discovery](#).

Disable the network discovery port using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Network** and then the **Interfaces** tab. The Network Interfaces page opens.
3. Uncheck **Make this device discoverable on the network as <uniqueID.local>**, then click **Apply**.

Configure network security

Pearl Nano supports 802.1x network security. You can choose the authentication method, upload user certificates and private key, as well as manage signed CA certificates using the Admin panel. You can also configure your Pearl device to use HTTPS.

Topics include:

- [Configure 802.1x network security and manage user certificates](#)
- [Manage CA and self-signed certificates](#)
- [Configure HTTPS](#)

For higher security, we recommend setting admin, operator and viewer-level passwords on the Pearl device, see [Change user passwords](#)

Configure 802.1x network security and manage user certificates

You can enable 802.1x security and configure the EAP method for the Pearl device to use for secure network access using the Admin panel. Supported EAP methods include:

- PEAP (default)
- EAP-TLS
- EAP-TTLS

Important considerations

- If TLS authentication is used on the network, then you need to get a user certificate and a user private key from the network administrator and upload those to your Pearl device as part of this procedure.
- Before you proceed with this setup, check that the network server's signed CA certificate appears in the list of CA certificates on the Pearl device and is valid, see [Manage CA and self-signed certificates](#).
- If the network server's CA certificate doesn't appear in the list of signed CA certificates and you can't obtain a valid signed CA certificate for network server authentication, do not check **Verify server's identity** when performing this setup.
- Security certificates must be PEM encoded.

Configure 802.1x and upload the user certificate and user private key using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Network**. The Network configuration page opens.
3. In the **Network Interfaces** box under **802.1x**, toggle **Enabled** and select an **EAP method**: PEAP, EAP-TLS, or EAP-TTLS.

4. (Optional) Check **Verify server's identity**.
5. Choose an **Authentication method** if you selected EAP-TTLS as the EAP method. The authentication method is automatically selected if PEAP or EAP-TLS is the EAP method.

Table 17 Authentication methods

EAP method	Authentication method
PEAP	EAP-MSCHAPv2
EAP-TLS	TLS
EAP-TTLS	EAP-MSCHAPv2
	TLS
	PAP

6. Enter the network access **User name** and **Password** to use for this device. Available fields depend on the EAP method that is selected.
7. If **TLS** is chosen as the Authentication method, upload a user certificate and a user private key. You can request those from your network administrator.
8. Click **Apply** when you're done.
9. Reboot the Pearl device when prompted. After the system has finished rebooting, log back in to the Admin panel as **admin** and verify that all changes were applied.



If you need to delete the user certificate or private key, click **Delete certificate**.

Manage CA and self-signed certificates

You can view the list of CA and self-signed certificates that come preloaded on Pearl Nano. CA and self-signed certificates are used for server authentication if **Verify server's identity** is selected when 802.1x network security is configured, see [Configure 802.1x network security and manage user certificates](#).

The self-signed certificate from Epiphan Video is selected by default. You can add more CA signed and self-signed certificates using the Admin panel, as well as delete any certificates that you've uploaded. You cannot delete any of the built-in CA certificates that came preloaded on Pearl Nano. Security certificates must be PEM encoded.

When using the Epiphan Video self-signed certificate on Pearl Nano:

- Your web browser may warn of an untrusted certificate when you try to access the web-based Pearl Nano Admin panel. You can dismiss the warning and continue to the Admin panel.
- Certain low and medium-level results are expected when scanning the network for vulnerabilities while Pearl Nano is connected and an active Admin panel session is in progress. Contact Epiphan Video [Support](#) for more information.

Manage CA and self-signed certificates using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Security**. The Security configuration page opens.
3. Under CA certificates, click the arrow head to expand the list of built-in CA and self-signed certificates that came preloaded on Pearl Nano.
4. To upload a new CA or self-signed certificate, click **Choose File** and select the certificate you want to upload. Then click **Apply**. The uploaded certificate is added to a list of user uploaded CA certificates.
5. To delete a CA or self-signed certificate that you've uploaded, click **Choose File** and select the certificate you want to delete from the list. Then click **Delete**. When you're done, click **Apply**.
6. Reboot the Pearl Nano when prompted. After the system has finished rebooting, log back in to the Admin panel as **admin** and verify that all changes were applied.

Configure HTTPS

You can configure Pearl Nano to use HTTPS for secure, local network access to the Admin panel, as well as for viewing the live channel preview stream on the local network using the Live broadcast URL.

The default HTTP port 80 redirects traffic to the default HTTPS port 443 when HTTPS is enabled. If the default ports used by the Pearl device are not available on your network, you can change them using the Admin panel, see [Change the HTTP/HTTPS port values](#).



Custom applications that use the Pearl device HTTP API should continue to work if you configure the Pearl device for HTTPS.

A default, self-signed certificate from Epiphan Video comes preloaded on the Pearl device. You can upload and delete your own certificate and private key. However, you cannot delete the default self-signed certificate that comes preloaded on the Pearl device.

If you upload your own self-signed certificate and private key, ensure they're PEM encoded. Certificates can either include the private key or be separate files.

If you attempt to access the web-based Admin panel using a web browser and the required security certificate isn't found in the list of certificates loaded on the Pearl device, a warning message appears stating that the device isn't trusted. You can choose whether to proceed and connect to the Pearl device's web-based Admin panel without the security certificate authentication or cancel the connection.



If the Epiphan Video self-signed certificate is selected, your web browser may warn of an untrusted certificate when you try to access Pearl's web-based Admin panel. You can dismiss the warning and continue to the Admin panel for your device.

Configure HTTPS and upload a self-signed certificate using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Security**. The Security configuration page opens.
3. Under HTTPS configuration, check **Secure connection (HTTPS)**.

HTTPS configuration

Secure connection (HTTPS)

HTTP port: (HTTP redirects to HTTPS port when HTTPS is enabled)

HTTPS port:

Current Certificate: Built-in self-signed certificate

Certificate info: Issuer: O=Epiphan Video, Subject: O=Epiphan Video, From: 08/09/2016 To: 08/07/2026, Valid

New certificate: No file chosen

Private Key: No file chosen

4. (Optional) Change the default HTTP and the HTTPS port numbers. Consult your network administrator.
5. (Optional) Upload a new certificate and private key as required. You can request those from your network administrator.



If the required certificate isn't included in the list of certificates on the Pearl device when you try and connect to the Pearl device using a web-browser, you'll receive a warning that the device isn't trusted.

6. Click **Apply** when you're done.
7. Reboot your Pearl device when prompted. After the system has finished rebooting, log back in to the Admin panel as **admin** and verify that all changes were applied.



If you need to delete the certificate you uploaded and the private key, click **Delete certificate**, or click **Restore default certificate**.

Configure HTTP Keep Alive Settings

You can customize the HTTP Keep Alive settings that the Pearl Nano will use with third-party connections. The values you can modify are the HTTP Keep-Alive Timeout and the HTTP Maximum Keep-Alive Requests.

HTTP Keep-Alive timeout:

Maximum amount of time Pearl Nano will keep a TCP connection to a third-party HTTP control system open

HTTP Maximum Keep-Alive requests:

The maximum number of HTTP Keep-Alive requests Pearl Nano will accept within the specified Keep-Alive timeout

Configure HTTP Keep-Alive Timeout and HTTP Maximum Keep-Alive requests

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Security**. The Security configuration page opens.
3. Under HTTPS configuration, find the **HTTP Keep-Alive Timeout and HTTP Maximum Keep-Alive Requests**.
4. Modify these values as needed.
5. Click **Apply** when you're done.
6. Your Pearl Nano will reboot. After the system has finished rebooting, log back in to the Admin panel as **admin** and verify that all changes were applied.

Configure system settings

Pearl Nano uses the current date and time in naming recorded files and when synchronizing and timestamping inputs from multiple sources (i.e. when synchronizing an audio and a video source). The Admin panel lets you specify date and time settings to ensure they are correctly configured for your time zone and your network. You can also add information like a unique device name, description, and location.

Topics include:

- [View the current date and time settings](#)
- [Configure a time server](#)
- [Manually set the date, time, and time zone](#)
- [Configure device info, name, description, and location](#)

Configure date and time

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

Topics include:

- [View the current date and time settings](#)
- [Configure a time server](#)
- [Manually set the date, time, and time zone](#)

View the current date and time settings

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

- From the Date and Time page using the Admin panel.

To manually set the date, time, and time zone using the Admin panel, see [Manually set the date, time, and time zone](#).

To change the server used for synchronizing time, see [Configure a time server](#). You can also set up a local Network Time Protocol (NTP) server on all Pearls.

View the current Date and Time settings using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Date and Time**. The Date and Time configuration page opens.

Table 18 Date and Time configuration options

Label	Description/Options
Time Zone	The currently selected time zone.
Enable local NTP server	Select to enable local NTP server.
Enable time synchronization	Whether or not a time synchronization protocol is being used for setting time. If not selected, time is set manually.

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

Configure a time server

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

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

Table 19 Supported time server types

Label	Description/Options
NTP	<p>Network Time Protocol (NTP) servers are used to synchronize system time. Many NTP servers are available on the Internet.</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 10px 0;">  Pearlcan also act as a local NTP server. </div> <p>All you need is the IP address of the NTP server and network access to the server to use that as the time synchronization source for Pearl Nano. For more information about NTP and to find NTP servers, refer to http://support.ntp.org/bin/view/Servers/WebHome.</p> <p>A local Windows NTP server is not supported.</p>
PTP v1	The Precision Time Protocol (PTP) is used for clock synchronization over the Internet. It has clock accuracy in the sub-microsecond range, making it more granular than NTP.



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

Set the time synchronization method using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Date and Time** . The Date and Time configuration page opens.
3. Select **Enable time synchronization** and choose the time synchronization protocol from the **Protocols** drop down.
 - a. If **NTP** is selected, enter the IP address or server name for the NTP server in the **Server IP Address** field.
 - b. If **PTP v1** is selected, choose a multicast address for the PTP v1 server from the **PTP domain** field.

Table 20 PTP multicast addresses

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

4. Click **Apply**.

Manually set the date, time, and time zone

Pearl Nano uses NTP for time synchronization by default. You can manually set the date, time, and time zone. Pearl Nano uses the Eastern (Canada) time zone by default.

Set the date, time, and zone manually using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Date and Time**. The Date and Time configuration page opens.

3. Enter the current date in the **Date** field using the format *yyyy-mm-dd* and enter the current time in the **Time** field using the format *hh:mm:ss*.
4. Select a time zone from the **Time Zone** field.
5. Click **Apply**.

Configure device info, name, description, and location

You can assign a unique device name to the Pearl device using the Admin panel and add information such as a description and location. Alphanumeric characters and hyphens are supported. The serial number of Pearl device is the default device name.

For AFU and USB file transfers that are configured to create a folder upon file upload, the device name you set for the Pearl device is used for the folder name instead of Pearl's serial number.

For CMSs, the device name you set here for the Pearl device appears as the registered name for this device.

Configure the device name, description, and location using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Info**. The system information page opens.

Pearl-2 TSG700558 info

Status

Date: Fri Dec 13 2020
 Time: 12:30:35 GMT-0500
 Uptime: 2 days 1:09:04
 System load: 18%

Firmware

Version: 4.12.01
 Revision: 47760_1823
 Date: 2020-12-06

Hardware

Serial number: TSG700558
 CPU board: Pearl-2
 BIOS: 10/06/2016

Device info

Name:

Description:

Location:

Channels

#	Name	Status	Recording	Streaming	Video inputs	Audio inputs	Codec	Frame size	Bitrate / Actual bitrate	FPS / Actual FPS
1	Auto A	▲	Stopped	Stream 1 Stopped	2 items	Auto A	H.264+AAC	1280x720	1.628 / 1.628 Mbps	30 / 30.000 View
2	Auto B	●	Stopped	No streams	Auto B	No items	H.264+AAC	1920x1080	0.660 / 0.660 Mbps	4 / 4.000 View

3. Under **Device info**, do any of the following and then click **Apply**:
 - a. Enter a name using alphanumeric characters including hyphens up to a maximum of 64 characters.
 - b. Enter a description using alphanumeric characters including hyphens up to a maximum of 50 characters.
 - c. Enter a location using alphanumeric characters including hyphens up to a maximum of 50 characters. alphanumeric characters and hyphens.

SD card and SATA M.2 2280 SSD storage

To record video with Pearl Nano, you need to install a storage medium. Pearl Nano has a standard SD card slot on the front panel that you can use. Pearl Nano also has a SATA M.2 2280 SSD storage expansion slot that's accessible from the underside. This slot only supports SATA drives, NVMe drives are not supported.



Adding a storage medium is not required if you are only live streaming.

The storage medium must be formatted as an EXT4 file system. The EXT4 formatted SD card cannot be used to transfer files to iOS or Windows systems. Download recordings using the Admin panel or another method such as Automatic File Upload (AFU) to a connected USB device.

When the storage medium is full, new recordings overwrite the oldest recordings. If you're using the Pearl Nano with a Content Management System (CMS), we recommend using large capacity storage mediums such as an SD card that's 256 GB or more. See: [CMS recording and webcasting control](#).

For important considerations when setting the maximum file size limit and recording to the storage medium, see [About recording](#).

SD Card Storage

You can format the SD card from the front screen menu or using the Admin panel. For detailed instructions, see [Install and format an SD card for the Pearl Nano](#).

For the SD card, we recommend using a minimum class 10 (C10) SD card that's at least 64 GB capacity but does not exceed 512 GB; however, most SD cards that are at minimum a C10, a UHS class 1 (U1), or a video speed class 10 (V10) should work.



Do not eject the SD card while recording is in progress as that may corrupt the SD card.

SSD Storage

The SATA M.2 SSD formats automatically the first time Pearl Nano is powered on after installing the SSD. You cannot use an SD card and the SATA M.2 SSD at the same time. For more information, see [Install and format a SATA M.2 2280 SSD for Pearl Nano](#).



When you install a SATA M.2 SSD, Pearl Nano no longer detects the SD card slot and the SD card option is removed from the Admin panel's Configuration menu. Ensure recordings are downloaded from the SD card before installing the SSD.

Install and format an SD card for the Pearl Nano

To record video on the Pearl Nano, you must install and format a storage medium, such as an SD card. One easy way to do that is using the front screen of the Pearl Nano. The Pearl Nano has a standard SD card slot on the front panel. If you want to format the SD card using the Admin panel, you need the IP address of your Pearl Nano and an admin computer connected to the same network. See: [Install and format an SD card for the Pearl Nano](#).



If you're only using the device for live streaming, then you don't need to install an SD card.



If you install a SATA M.2 2280 SSD in the Pearl Nano, the device no longer detects the SD card. NVMe drives are not supported. See: [Install and format a SATA M.2 2280 SSD for Pearl Nano](#).

If you're using a Pearl Nano with a Content Management System (CMS), we recommend using large capacity SD cards such as 256 GB or more. See: [CMS recording and webcasting control](#).

We recommend using at least a class 10 (C10) SD card that's 64 GB capacity but does not exceed 512 GB; however, most SD cards that are at minimum a C10, a UHS class 1 (U1), or a video speed class 10 (V10) should work. The SD card must be EXT4 formatted, this can be done by the Pearl Nano. After the SD card is installed and formatted for the EXT4 format, you are ready to record.

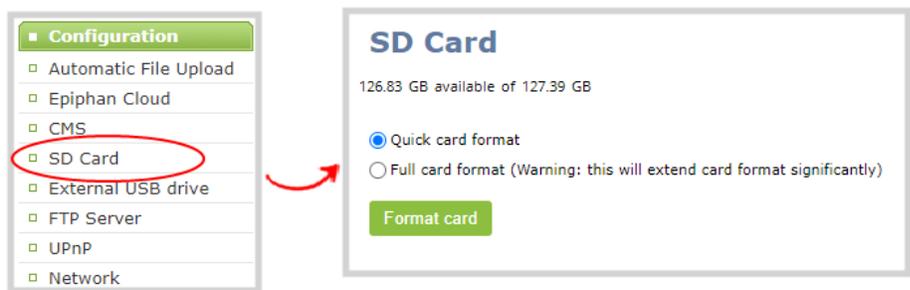


Any content that's contained on the SD card is lost when the SD card is formatted. The EXT4 formatted SD card cannot be used to transfer files to iOS or Windows systems. Use a USB memory device to manually transfer files instead.

 Ejecting the SD card while recording is in progress may corrupt the SD card and cause loss of data.

Format the SD card using the Admin panel

1. Insert the SD card into the SD card slot on the front panel.
2. Log in to the Admin panel as admin. See: [Connect to the Admin panel](#).
3. From the Configuration menu, select **SD Card**. The SD Card configuration page opens.



4. Select either quick disk format or the full disk format, then click **Format card**. A full disk format checks for bad blocks on the SD card and marks any that are found on the EXT4 partition.

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

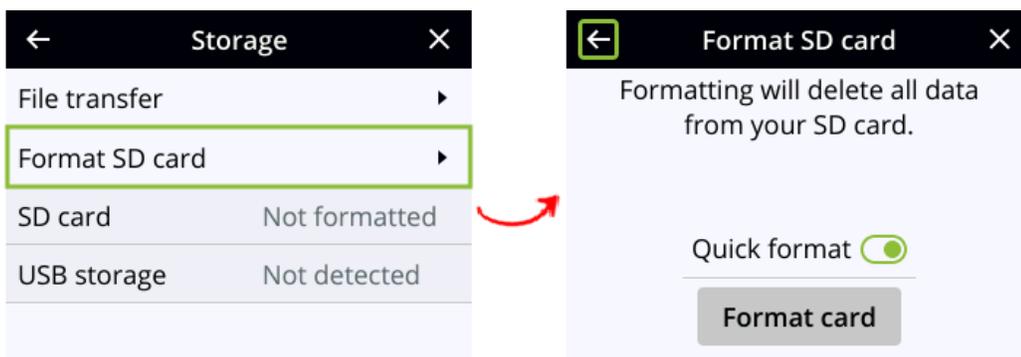
 Do not remove the SD card while it is being formatted. Very large SD cards can take a while to format. Please be patient and wait for the formatting message to disappear.

Format an SD card using the front screen

1. Power on the Pearl Nano.
2. Insert the SD card into the SD card slot.
3. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



- 4. Use the arrow and check mark keys to select **Storage**. Then from the Storage screen, select **Format SD card** to open the Format SD card screen.



- 5. (Optional) Highlight **Quick format** and press the **check mark** key to toggle the switch on or off.
- 6. Highlight **Format card** and press the **check mark** to start the process. The formatting in progress screen appears and the LED beside the SD slot starts flashing.
- 7. When the screen indicates formatting is complete and the LED is solid off, press the **check mark** to return to the previous screen.

Install and format a SATA M.2 2280 SSD for Pearl Nano

You can install a user-supplied SATA M.2 2280 SSD for storing recorded video. Only SATA M.2 drives are supported, NVMe drives are not supported. Pearl Nano automatically formats the SSD using the EXT4 format for its Linux-based operating system the first time you power it on after installation. Please be patient while the formatting completes.

When you install a SATA M.2 SSD, Pearl Nano no longer detects the SD card slot and the SD card option is removed from the Admin panel's Configuration menu. For more information about using different storage mediums and recommendations, see [SD card and SATA M.2 2280 SSD storage](#).

 Any existing content on the SSD is lost when the SSD is formatted.

Before you begin

Gather the tools you need:

- #2 Phillips screwdriver
- #0 Phillips jeweler's screwdriver
- (Optional) a pair of tweezers

Install and format the SATA M.2 2280 SSD

1. Disconnect the power cable and ensure the Pearl Nano is powered off. If the Pearl Nano is using PoE+ power from the connected RJ-45 Ethernet cable, ensure you disconnect the Ethernet cable from the Pearl Nano.

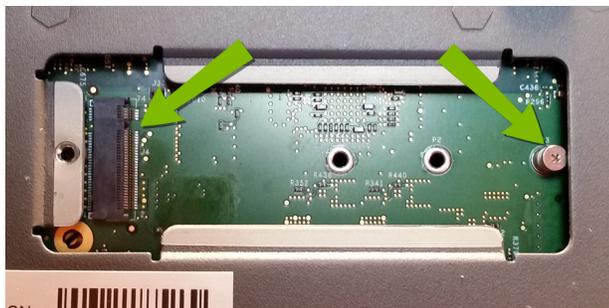


Permanent damage to the SSD and/or Pearl Nano can occur if you install, remove, or replace the SSD while the device is powered on.

2. On a clean and level surface, turn Pearl Nano over to expose the bottom panel.
3. Use a #2 Phillips screwdriver to remove the SSD expansion slot cover plate. Set aside for later.



4. Use a #0 Phillips screwdriver to remove the screw that's in the post farthest away from the M.2 socket. Set aside for later.



5. Hold the SSD by the edges and insert firmly into the M.2 socket at approximately a 30° angle. Make sure you align the key notch in the SSD with the notch in the M.2 socket.
6. Use one hand to gently press and hold the SSD down so that it rests atop the post. Align the notch on the SSD with the post hole.
7. With your other hand, use a #0 Phillips screwdriver to reinstall the post screw and secure the SSD in place.

TIP: Use the tweezers to pick up the screw if it falls behind the SSD.

8. Reinstall the SSD slot cover plate and power up Pearl Nano.

The SSD is formatted automatically the first time you power on. Please be patient while formatting completes. The amount of time it takes to format depends on the capacity of the SSD. You must wait for the formatting to finish before recording video to the SSD.



Powering off Pearl Nano while the SSD is formatting could damage or corrupt the SSD.

Audio input ports

You can connect external audio devices like mixers directly to the dedicated audio input ports on Pearl Nano. Each Pearl model has a unique set of audio input ports.

Topics include:

- [Configure audio ports for stereo or mono](#)
- [Assign audio sources to an input](#)
- [Adjust audio gain and delay](#)
- [Mute audio](#)

Pearl Nano

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

The XLR audio inputs are configured as a stereo pair by default: XLR1 (left) and XLR 2 (right). The XLR audio ports and the RCA audio ports are linked. You can configure Pearl Nano to use both or just one of the audio sources from the front screen menu or using the Admin panel.

For details about the audio inputs, see [Pearl Nano AV inputs](#).

Selecting an audio source

Choose different audio sources for a channel using the Admin panel .

Select your audio sources from connected video source, as well as from the dedicated analog audio input ports. The USB port on the rear panel accepts a USB microphone (UAC).

Stereo pairs

XLR and TRS combo jacks are configured as left/right stereo pairs by default, see [Configure audio ports for stereo or mono](#). The 3.5 mm audio ports and the RCA audio ports are linked.

see [Assign audio sources to an input](#) to configure Pearl Nano to use both or just one audio source.

Linked ports

- On Pearl Nano, the XLR audio ports and the RCA audio ports are linked.

Audio gain guidelines

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



To connect microphones to the pro line level XLR inputs on Pearl-2 and Pearl Nano, you must use an external preamp to boost the microphone signal enough to provide the proper line level signal at the XLR input port, see [Connecting microphones to the XLR line level inputs](#).

Table 21 Audio gain guidelines for different audio devices

Audio source	Input port	Gain
Dynamic microphone	XLR	Pearl Mini and Pearl Nexus: Add +50 to +60 dB gain to the audio input port. Pearl-2 and Pearl Nano: Not recommended. See note above table.
	3.5 mm (Pearl Mini only)	Pearl Mini and Pearl Nexus: Add +6 to +12 dB gain to the audio input port.
Electret microphone	XLR	Pearl Mini and Pearl Nexus: Add +18 to +40 dB gain to the audio input port. Pearl-2 and Pearl Nano: Not recommended. See note above table.
	3.5 mm (Pearl Mini only)	Pearl Mini and Pearl Nexus: Add +6 to +12 dB gain to the audio input port.
Wireless microphone receiver	XLR	Pearl Mini and Pearl Nexus: Add +18 to +40 dB gain to the audio input port. Pearl-2 and Pearl Nano: Not recommended. See note above table.
	3.5 mm	Pearl Mini and Pearl Nexus: Add +6 to +12 dB gain to the audio input port. Pearl-2 and Pearl Nano: Not supported.
Condenser microphone with phantom power (Pearl Mini only)	XLR	Pearl Mini and Pearl Nexus: Add +40 to +60 dB gain to the audio input port.
Mobile phone or other consumer line level device	XLR	Pearl-2 and Pearl Nano: Add +6 to +12 dB gain to the audio input port.
	TRS (Pearl Mini and Pearl Nexus only)	Add +6 to +12 dB gain to the audio input port.
	RCA ¹	Nominal

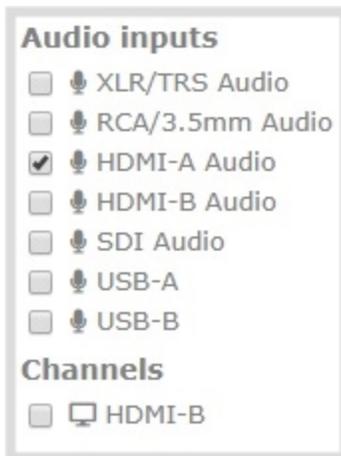
Audio source	Input port	Gain
Professional mixer	XLR	Nominal
	TRS (Pearl Mini and Pearl Nexus only)	Nominal
	RCA ¹	Not recommended.
USB microphone	USB	Nominal

¹ To avoid unwanted signal noise on the RCA ports, we recommend adding no more than 12dB of gain to the RCA port or when XLR B/RCA is used

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

Selecting an audio device for the channel:

1. Using a web browser on the admin computer, go to the IP address of your Pearl device and log in, see [Connect to the Admin panel](#).
2. From the Channels menu, select your channel (i.e. HDMI-A or HDMI-B) and click **Layouts**. The custom channel layout editor page opens.
3. Check the audio source that you want to use for the layout and click **Save**.



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

Connecting microphones to the XLR line level inputs

The XLR analog audio input ports on Pearl-2 and Pearl Nano are professional line level inputs rated at +4.0 dBu up to 12.3 V RMS, (+24 dBu). You can't connect microphones directly to the XLR ports because the microphone signal is too low.

If you want to connect microphones to the line-level XLR ports on the Pearl-2 or Pearl Nano, you must use an external preamp and boost the mic level signal to the appropriate line level before connecting it to the XLR port.

Configure audio ports for stereo or mono

Using the Admin panel, you can configure ports to function as a stereo pair (left/right) or as separate mono ports.

Pearl Nano

The two XLR professional line-level inputs are configured as a stereo pair by default: XLR 1 (left) and XLR 2 (right).

Configure audio ports as stereo or mono using the Admin panel

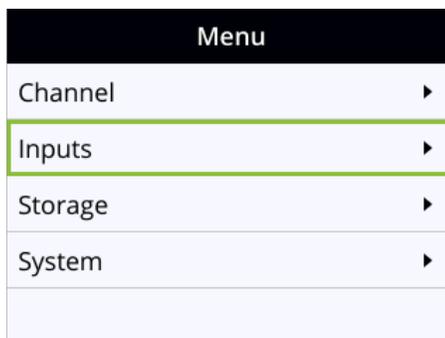
1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. Open the configuration page from the Inputs menu:
 - **Pearl Nano:** click **XLR/RCA Audio**. The XLR/RCA Audio configuration page opens.
3. Do one of the following.
 - a. To make the ports function as a stereo pair, check **Stereo pair** and click **Apply**.
 - b. To make the ports function as separate mono ports, uncheck **Stereo pair** and click **Apply**.



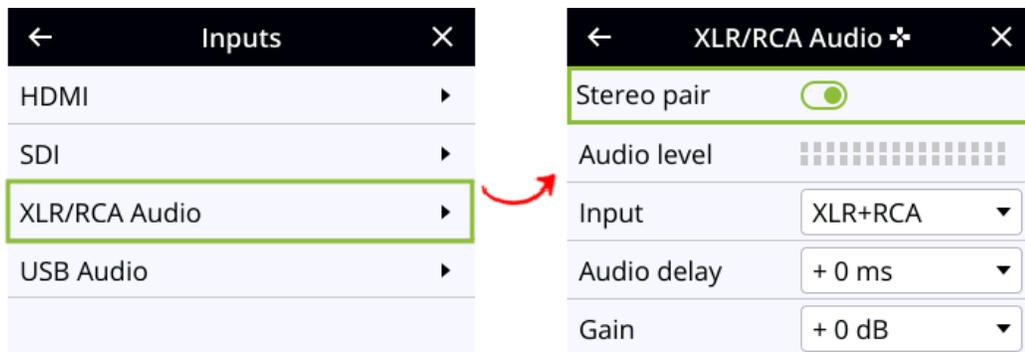
When mono is selected, two sets of parameters and two audio VU meters appear in the interface - one for each audio input port on the Pearl device. Parameters that are listed only once apply to both ports.

Configure audio ports as stereo or mono using the Pearl Nano front screen

1. Repeatedly press the **left arrow** key on the control interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **Inputs**. Then from the Inputs screen, select **XLR/RCA Audio** to open the XLR/RCA Audio screen.



3. Highlight **Stereo pair** and press the **check mark** key to toggle the switch on or off.

Assign audio sources to an input

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

The audio sources that share resources are:

Pearl Nano

- XLR 1 and XLR 2 (left and right ports, respectively)
- RCA (left and right ports)

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



To avoid unwanted signal noise on the RCA ports, we recommend adding no more than 12dB of gain when RCA, XLR+RCA (for Pearl-2 and Pearl Nano), or XLR+3.5mm (for Pearl Mini and Pearl Nexus) is selected.

Assign the audio source to an input using the Admin panel

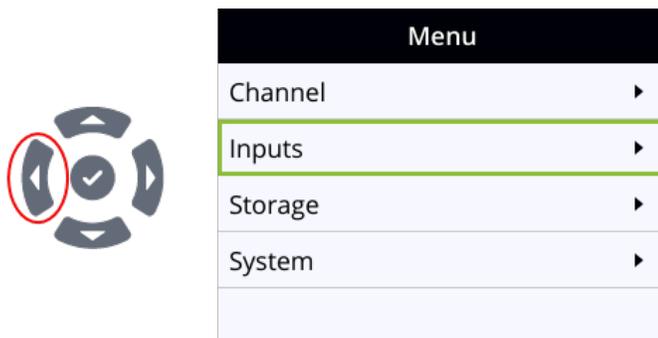
1. Login to the Admin panel as **admin**. See [Connect to the Admin panel](#).
2. From the Inputs menu, select the shared audio source. The audio configuration page opens.

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

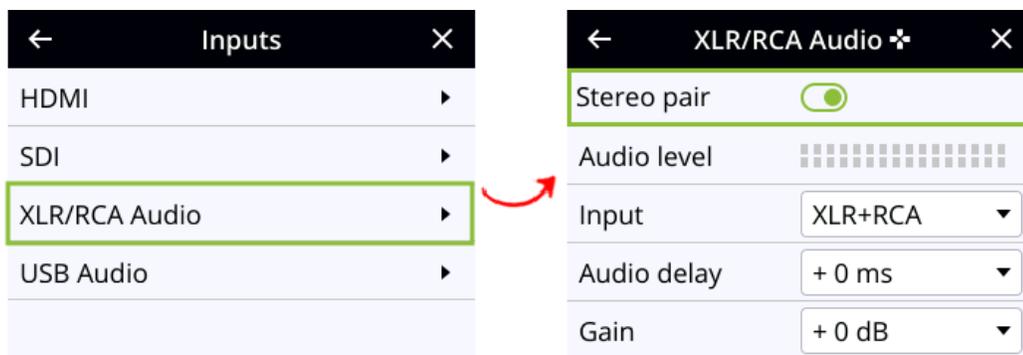


Assign the audio source to an input using the front screen on Pearl Nano

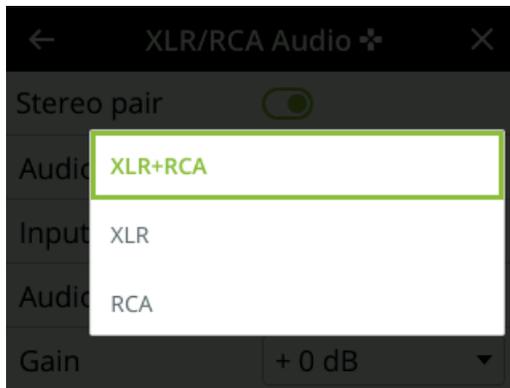
- 1. Press the **left arrow** key repeatedly on the control interface until the Menu screen displays.



- 2. Use the arrow and check mark keys to select **Inputs**. Then from the Inputs screen, select **XLR/RCA Audio** to open the XLR/RCA Audio screen.



- 3. From the XLR/RCA Audio screen, highlight **Input** and press the **check mark** key to display options.



4. Highlight the option you want, then press the **check mark** to select and return to the previous screen. To return to the previous screen without making a selection, press the **left arrow** key.

Adjust audio gain and delay

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

You can apply from -300 ms to +300 ms of delay to any audio source using the Admin panel or Pearl Nano front screen. By default, there's 0 ms of delay applied to audio sources.

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



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

Adjusting the **Input Gain** for an analog audio source affects the volume for that audio source in recordings, streamed output, video output ports, and in the headphone jack. Be aware that excessive amounts of gain can increase the perception of any noise that may be present in the audio signal.

If the gain of your analog audio signal needs adjustment, connect your headphones and use the VU meters to monitor the audio level while you add some gain. As a rule, each 10 dB of gain doubles the perceived loudness of the audio signal.

This table offers some guidelines for adjusting the gain at the audio input port of Pearl Nano for common types of audio input devices. You should add the suggested gain to the audio input to get an average

signal to register at a nominal level in the VU meter (i.e. where the green bars change to yellow). The actual amount of gain needed depends on the strength of the original audio signal.

Table 22 Audio input port gains guidelines

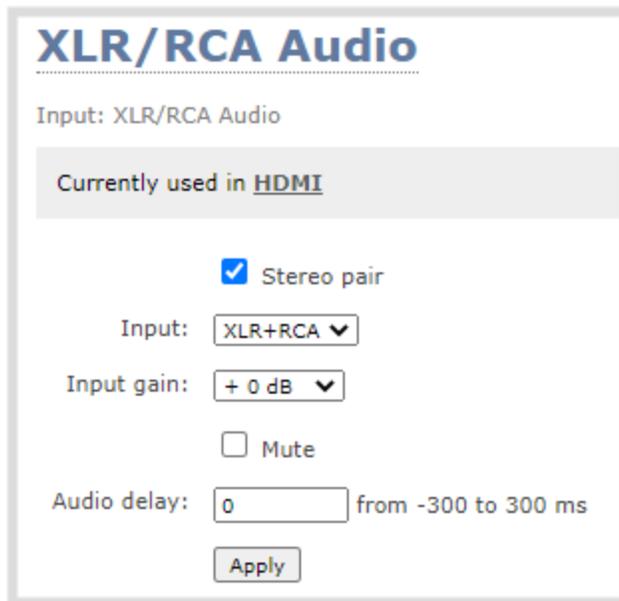
Audio source	Input port	Gain
Mobile phone or other consumer line level device	XLR	Add +6 to +12 dB gain to the audio input port.
	RCA ¹	Nominal
Professional mixer	XLR	Nominal
	RCA ¹	Not recommended.
USB microphone	USB	Nominal
Dynamic, condenser, or electret microphones	XLR	Not recommended. To connect microphones to the pro line level XLR inputs, you must use an external preamp to boost the microphone signal enough to provide the proper line level signal at the XLR input port, see Connecting microphones to the XLR line level inputs .

¹ To avoid unwanted signal noise on the RCA ports, we recommend adding no more than 12dB of gain to the RCA port or when XLR/RCA is used, see [Assign audio sources to an input](#).

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

Adjust the gain and delay for an audio source using the Admin panel

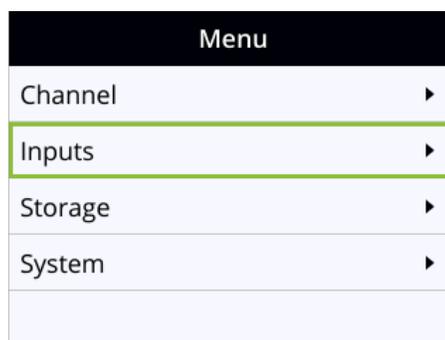
1. Log in to the Admin panel as **admin**. See [Connect to the Admin panel](#).
2. From the Inputs menu, select an audio source. The audio configuration page for the audio source opens.



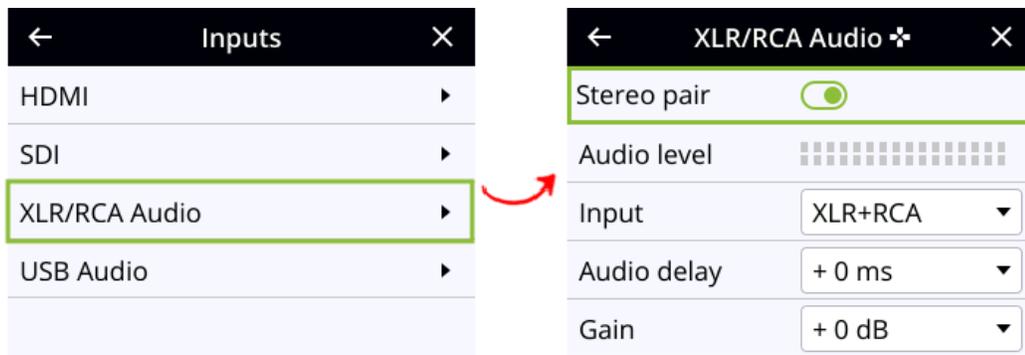
3. In the **Input Gain** field, select the amount of gain to apply to the audio source.
4. In the **Audio delay** field, enter a value between 300 and -300 ms. A positive value adds delay to the audio signal. A negative value adjusts the audio to start earlier.
5. Click **Apply**.

Adjust the gain and delay for an audio source using the front screen

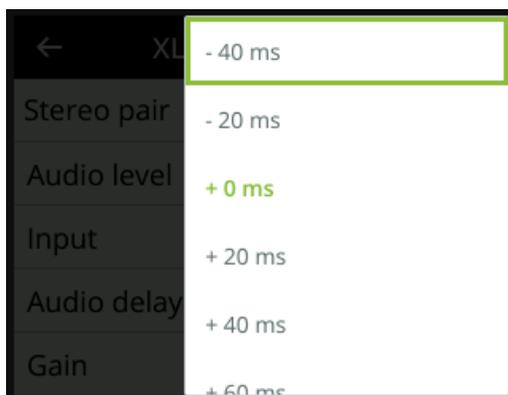
1. Repeatedly press the **left arrow** key on the control interface until the Menu screen displays.



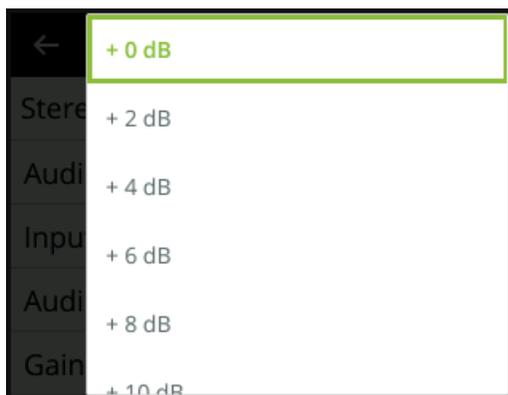
2. Use the arrow and check mark keys to select **Inputs**. Then on the Inputs screen, select **XLR/RCA Audio** to open the XLR/RCA Audio screen.



- 3. To adjust audio delay from the XLR/RCA Audio screen, highlight **Audio delay** and press the **check mark** key to display options.



- 4. Highlight the amount of delay you want using the up and down arrow keys, then press the **check mark** key to select and return to the previous screen. To return to the previous screen without making a selection, press the **left arrow** key.
- 5. To adjust the gain from the XLR/RCA Audio screen, highlight **Gain** and press the **check mark** key to display options.



- Highlight the amount of delay you want using the up and down arrow keys, then press the **check mark** key to select and return to the previous screen. To return to the previous screen without making a selection, press the **left arrow** key.

Mute audio

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

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

Table 23 Muting audio inputs that share resources

Device	Audio input (Admin panel)	Shared audio input resources	Results
Pearl Nano	XLR/RCA Audio	XLR (left/right) RCA (left/right)	In stereo mode: Both XLR ports (left and right) are muted. Both RCA ports (left and right) are muted
			In mono mode (XLR/RCA audio Left muted): Both the XLR 1 (left) and RCA left ports are muted. The XLR 2 (right) and RCA right ports are not muted.
			In mono mode (XLR/RCA audio Right muted): Both the XLR 2 (right) and RCA right ports are muted. The XLR 1 (left) and RCA left ports are not muted.

Mute an audio source using the admin panel

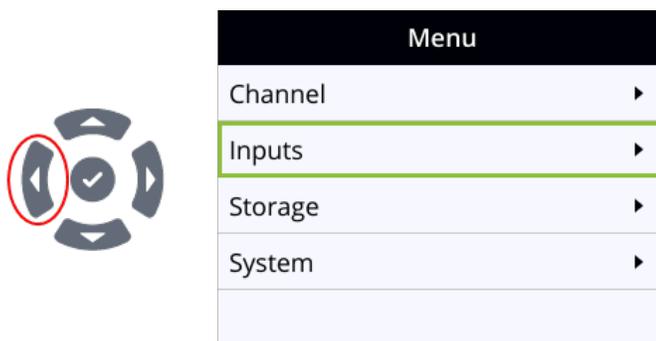
- Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
- From the Inputs menu, select an audio source. The audio configuration page for the audio source opens.

3. Check **Mute** to mute the audio source or uncheck **Mute** if you no longer want the audio source muted, then click **Apply**.

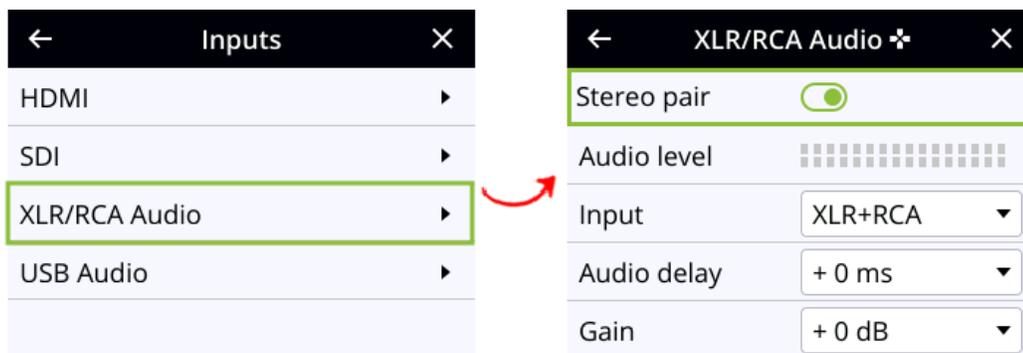


Mute an audio source using the front screen

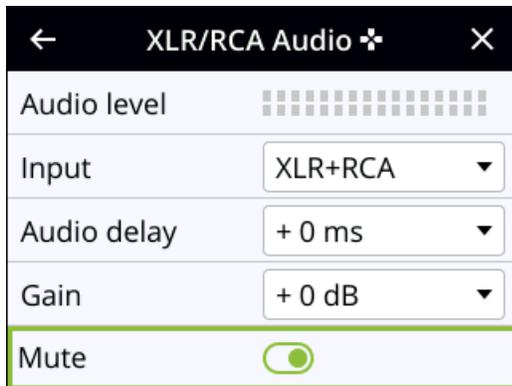
1. Press the **left arrow** key repeatedly on the control interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **Inputs**. Then from the Inputs screen, select **XLR/RCA Audio** to open the XLR/RCA Audio screen.



3. From the XLR/RCA Audio screen, press the **down arrow** key repeatedly until **Mute** appears on screen and is highlighted.



4. Press the **check mark** key to toggle the switch on or off.

Video output ports

The HDMI video output port can send video from the Pearl device to connected devices like a display for confidence monitoring, an in-room projector, or even a video wall. You can use the Admin panel or the Pearl device screen menu to send any video source or channel to the video output port with (or without) the audio.

Use MultiViewer to display a custom mix of channels and video sources in a convenient grid for confidence monitoring with minimal impact to your system's processor.



Since the Pearl Nano has one channel, MultiViewer on the Pearl Nano displays a custom mix of up to two video sources including the channel on the HDMI output port.

Topics include:

- [About video output ports](#)
- [Video output port resolution](#)
- [Set up the video output port using the Admin panel](#)
- [Set up and enable MultiViewer](#)
- [MultiViewer system information](#)
- [Select the video output source using the device screen](#)
- [Preview the video output port](#)
- [Disable the video output port](#)
- [Disable or enable audio and output port volume](#)
- [Display and reposition the audio VU meter](#)

- [Rename a video output port](#)
- [Mirror the video output port display](#)

About video output ports

Pearl Nano

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



Pearl Nano also has an HDMI video pass through port that outputs the HDMI IN signal with no added latency. The HDMI PASS-THROUGH port is not user configurable and does not modify the input video signal that is passed through.



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

You can use the Admin panel to configure the video output port parameters. If you're simply selecting a video source or channel and enabling/disabling audio for the output port, you can use your choice of either the Admin panel, or Epiphan Live (if you are using a Pearl Mini, Pearl Nexus, or Pearl-2). For channels that have audio, the audio is enabled by default.

Important considerations

- When changing encoding parameters for a channel that's displayed on the video output port, it may revert to the display's default resolution if the output resolution is set to "Same as source". To resolve this, change the video output to a different resolution then back to "Same as source".
- When using the video output port for confidence monitoring, some delay can be expected. For a 1080p video source, the average delay on the video output port is approximately 100 ms. For a 1080p channel, the average delay on the video output port is approximately 300 ms. The actual amount can vary, depending on the setup.
- If an SDI or HDMI video input source that is selected to display at the HDMI output port also appears in a custom layout for a channel, then the channel's encoding settings are used at the HDMI output. Changing the channel's frame rate will change the frame rate used at the output port for that video input.
- **Pearl-2, Pearl Mini, and Pearl Nexus** - Using the video output ports adds to the overall system load on the Pearl device. If your system has a high system load and you're using the video outputs, monitor the frame rate of your channels on your Pearl device and adjust your setup if there's an unacceptable drop in the frame rate. Remedial measures you can take include eliminating video scaling at the inputs, adjusting the encoding bitrates,.
- Use MultiViewer to preview multiple sources, including system information like channel status and audio information, on the video output port in a grid for confidence monitoring with minimal impact to system loading.

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)
1		n/a	Any (1024×768, 1280×720, 1280×960, 1360×768, 1400×1050, 1920×1080)
2	passive converter	passive converter	
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	passive converter	One of the two displays will fail to receive a signal. Do not mix passive converters with active converters and

Number of Displays	Cable 1	Cable 2	Output resolution
	DisplayPort cable		DisplayPort cables.
2	passive converter	active converter or DisplayPort cable	

Related links

[Set up the video output port using the Admin panel](#)

[Set up and enable MultiViewer](#)

[Select the video output source using the device screen](#)

Video output port resolution

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



Pearl Nano always assumes that the output display uses square pixels.

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

By default, you can choose from the following output resolutions for your video output ports, but you can also change settings to allow a variety of other resolutions through.

Set up the video output port using the Admin panel

You can send a channel or a video source to the video output port using the Admin panel. You can also adjust the video output resolution, aspect ratio, and choose to include audio. The video output port frame rate is set automatically to the channel's configured frame rate for that video source.

When outputting a channel that has audio or a video source with embedded audio, you can adjust the volume and choose to include the audio meter. The audio meter is set to a fixed size of 15% of the width (or height if displayed horizontally) of the display.



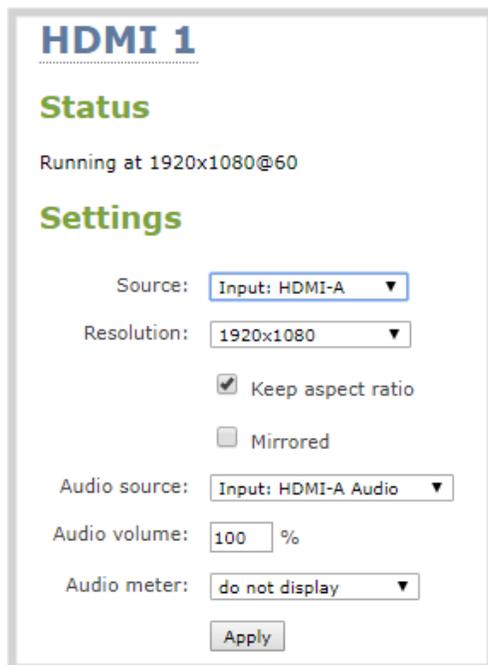
The HDMI pass-through port only displays the identical video signal with audio that is received at the HDMI IN port on Pearl Nano.

Important considerations

To select the video you want to appear on the output port using see [About video output ports](#).

Set up a channel or video source to display on the video output port using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Output ports menu, click the output port (). The video output port configuration page opens.
3. In the **Source** field, select a channel (prefixed by the word **Channel**) or a video source (prefixed by the word **Input**).



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

Device	Value	Description
All	Same as source	Set the output to the same resolution as the channel or video source. If that resolution is not supported by the display, the video output port will negotiate a new resolution with the display (generally this ends up being the display's default resolution).
All	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.
Pearl Nano	1024×768, 1280×720, 1280×960, 1360×768, 1400×1050, 1920×1080	Choose a specific resolution for the output port.

5. Do one of the following:
 - a. Check **Keep aspect ratio check** to have the system maintain the correct aspect ratio. If the aspect ratio is different between the source and the chosen display aspect ratio, black bars are automatically inserted at the top and bottom or left and right sides of the video.
 - b. Uncheck **Keep aspect ratio check** to have the system stretch the source to fit the aspect ratio of the display.
6. For a channel, do the following:
 - a. Check **Enable audio** to include audio in the output. Leave this unchecked for no audio with the video.
 - b. (Optional) For a channel with audio enabled, adjust the volume. Enter a value from 0 to 100 percent in the **Audio volume** field.
 - c. (Optional) For a channel with audio enabled, choose whether or not to display the audio meter from the **Audio meter** drop down.
 - d. If displaying the audio meter, select horizontal or vertical from the **Audio meter orientation** drop-down menu to change the orientation of the displayed audio meter.

7. For an input source, do the following:
 - a. Select an **Audio source** from the drop down list.
 - b. (Optional) Adjust the volume. Enter a value from 0 to 100 percent in the **Audio volume** field.
 - c. (Optional) Choose whether or not to display the audio meter from the **Audio meter** drop down.
 - d. If displaying the audio meter, select horizontal or vertical from the **Audio meter orientation** drop-down menu to change the orientation of the displayed audio meter.
8. Click **Apply**.



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

Set up and enable MultiViewer

MultiViewer displays a custom mix of video sources including channels on the HDMI output port in a convenient grid for confidence monitoring with minimal impact to the system's processors. MultiViewer features differ by Pearl device:

- **Pearl Nano** - two video sources. Side-by-side grid.



The HDMI pass-through port only displays the identical video signal with audio that is received at the HDMI IN port on Pearl Nano.

Save processing power so you can do more with your Pearl system while previewing multiple video sources on the HDMI output port. With MultiViewer, the video output displays at a lowered frame rate to economize CPU usage. Using MultiViewer does not lower the frame rate of channel recordings and live streams.

No audio signal present at the output port, but audio meters do display for channels and video sources that have embedded audio signals.

Use the Admin panel to choose which video sources appear in the pre-configured MultiViewer grids and to set the video output port resolution. You can enable MultiViewer for the output port using the Admin panel, the Pearl device screen, and using local console.



Deleted network sources or channels may appear in MultiViewer.

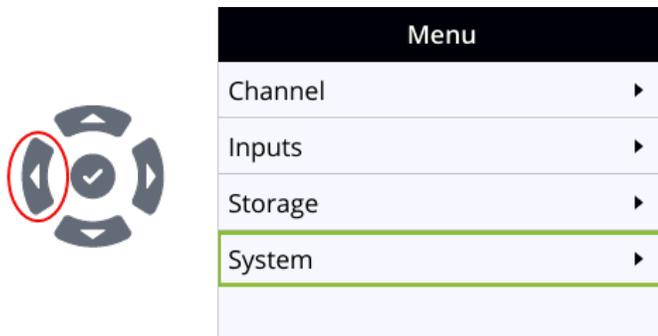
Set up and enable MultiViewer using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Output ports menu, click the output port (). The video output port configuration page opens.
3. In the **Source** field, select **MultiViewer**.
4. In each cell of the grid, select a channel, video source, or system information.
 - **System Information > Channels** : provides you with information on **Channel** status or **Audio Inputs** status. For more information, see [MultiViewer system information](#).
 - **Show information about upcoming and ongoing CMS events** (optional) - Select the check box and MultiViewer displays the name of upcoming or ongoing events, time remaining before upcoming events, and the time remaining of an ongoing event.
 - **Text size** (optional) - Increase or decrease to change the size of the display text in MultiViewer.
5. In the **Output Resolution** field, select the resolution for the video output port and then click **Apply**.

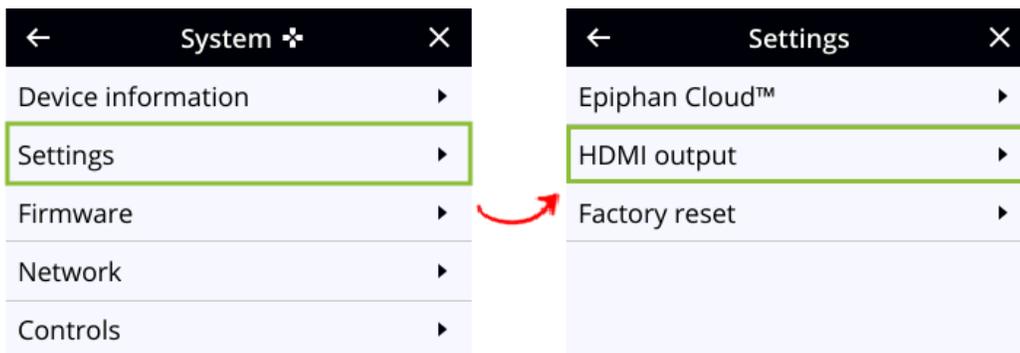
Value	Description
Destination default	This is the default value. Each display has a preferred resolution, and when you choose this setting, the video output port will use the display's default resolution.
<ul style="list-style-type: none"> • All devices: 1024×768, 1280×720, 1280×960, 1360×768, 1400×1050, 1920×1080 	Choose a specific resolution for the output port.

Enable MultiViewer using Pearl Nano's front screen menu

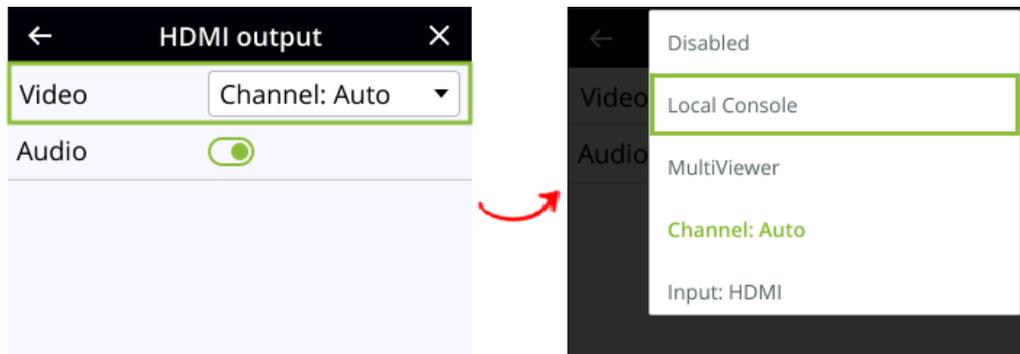
1. Press the **left arrow** key repeatedly on the control interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Settings** to open the Settings screen.



3. From the Settings screen, select **HDMI output** to open the HDMI output screen, then press the **check mark** key to select Video. The available video sources display.



4. Highlight **MultiViewer**, then press the **check mark** key to select and return to the previous screen. To return to the previous screen without making a selection, press the **left arrow** key.

MultiViewer system information

MultiViewer can display system information, including channel and audio input information. To display system information in the MultiViewer, select **Channels** or **Audio Inputs** in the **Source** drop-down on the HDMI outputs page.

Channels

If **Channels** is selected, the following information is displayed on the MultiViewer:

- **Channel** - the status of the channel status
 -  - There are no errors or warnings, and the channel is ready to use.
 -  - There is an error with either the channel's recorder or any of the channel's publishers.
 -  - There are publishing warnings. This is also shown if the channel is not in running state.
- **Recording** - The recording status of the channel
 -  - Currently recording
 -  - Recording error
 - **Stopped** - Not currently recording
- **Streaming** - The streaming status of the channel
 -  - There are active publishers. The numbers show how many publishers are active.
 -  - Publishing errors, and the number of publishing errors.
- **Actual FPS** - The current rate of frames per second

Audio Inputs

A list of the active audio inputs on the Pearl device.

- **Input name** - the name of the audio input
- **Audio meter** -
 -  - the audio is live and the input is being monitored

Select the video output source using the device screen

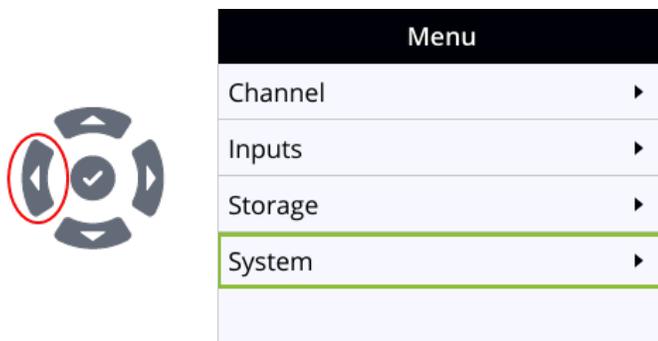
It's easy to change the video source that appears at the video output port using the front screen or touch screen. For video sources that have audio, you can enable and disable the audio as well. Audio is enabled by default.



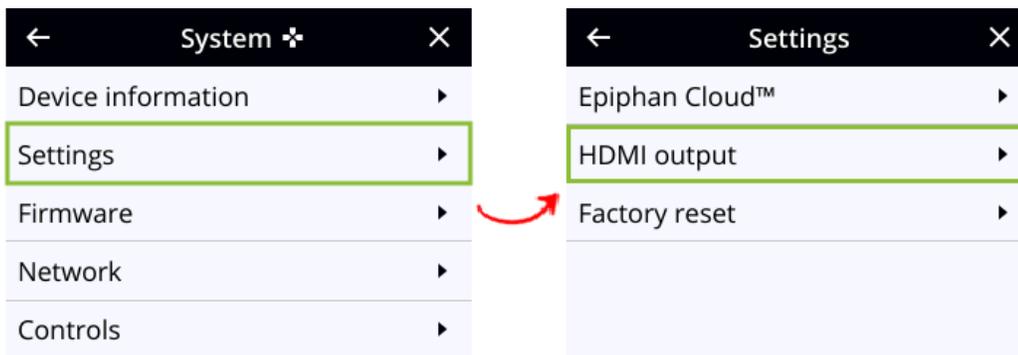
To configure the video output port parameters, use the Admin panel. See **Video output ports**.

Select the video output source using Pearl Nano's front screen menu

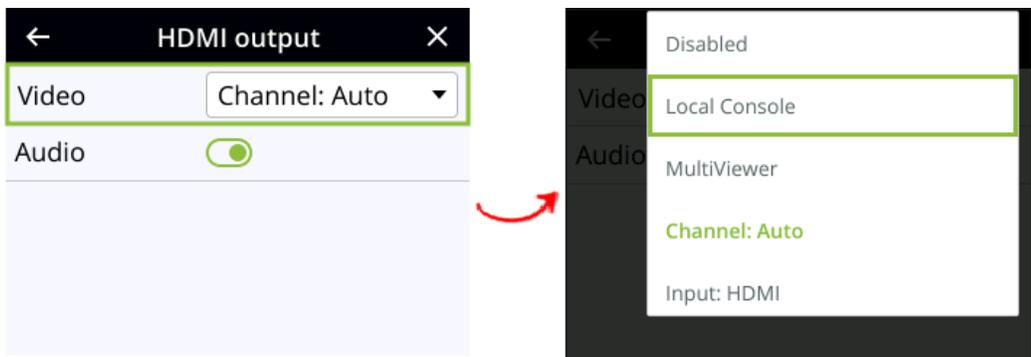
1. Press the **left arrow** key repeatedly on the control interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Settings** to open the Settings screen.



3. From the Settings screen, select **HDMI output** to open the HDMI output screen, then press the **check mark** key to select Video. The available video sources display.



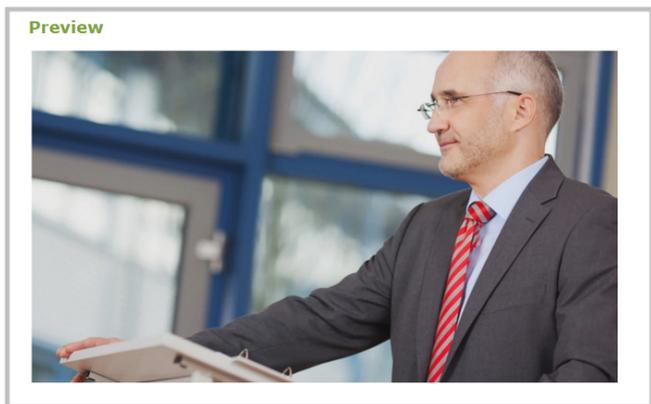
- 4. Highlight the source you want to display on the output, then press the **check mark** key to select and return to the previous screen. To return to the previous screen without making a selection, press the **left arrow** key.

Preview the video output port

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



The preview is updated every few seconds and always maintains the same aspect ratio as the source it is copying. It doesn't reflect black bars, the audio meter or actual aspect ratio/resolution on the display.



If the video output port is showing a source and that source has no signal, the source's no signal image is displayed.

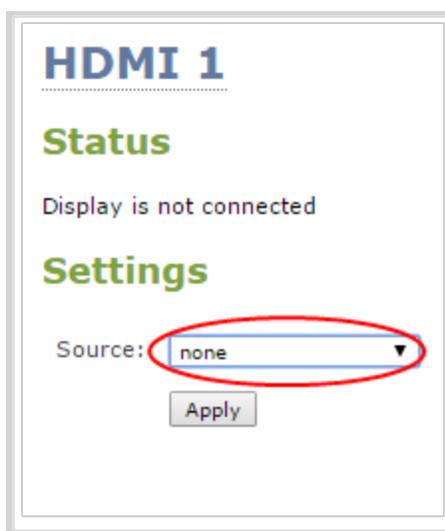
If the video output port is showing a channel and that channel is unavailable or has no signal, a no signal message is shown for 2.5 seconds, then the display output is changed to a black screen.

Disable the video output port

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

Disable the video output port using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Output ports menu, click the output port (). The video output port configuration page opens.
3. In the **Source** field, select **none** to disable the video output port and then click **Apply**.



Disable or enable audio and output port volume

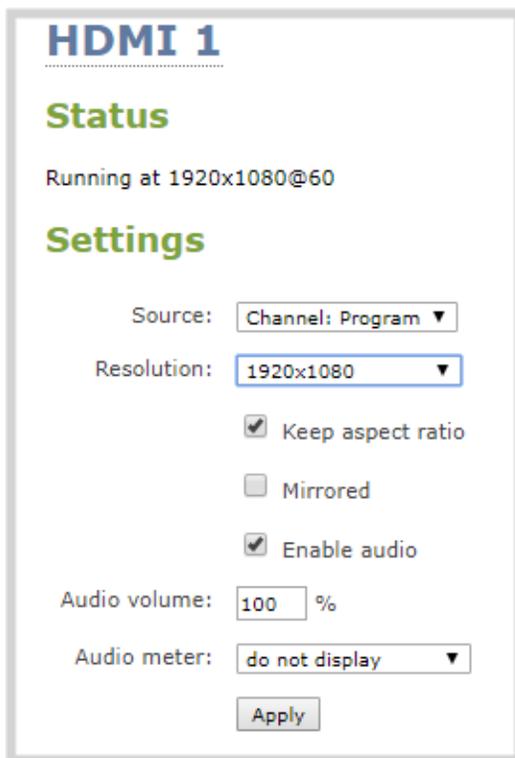
If you're displaying a channel as the source for your video output port, audio for that channel is also encoded and sent over the port by default. You can disable the audio on the output port using the Admin panel. You can also adjust the volume of the audio on the video output port using the Admin panel.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

If you're displaying a video input as the source for your video output port, you can select an audio source and adjust the volume. Audio is taken from the video input source you've selected for the video output port by default.

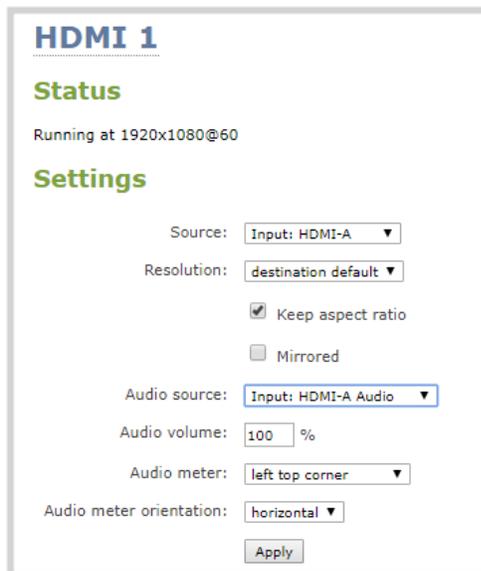
Disable audio for a channel on the video output port and adjust the volume using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).

2. From the Output ports menu, click the output port (). The video output port configuration page opens.
3. For a channel, do the following:
 - a. Check **Enable audio** to include audio in the output. Leave this unchecked for no audio with the video.
 - b. (Optional) For a channel with audio enabled, adjust the volume. Enter a value from 0 to 100 percent in the **Audio volume** field.
 - c. (Optional) For a channel with audio enabled, choose whether or not to display the audio meter from the **Audio meter** drop-down menu.
 - d. If displaying the audio meter, select horizontal or vertical from the **Audio meter orientation** drop-down menu to change the orientation of the displayed audio meter.



4. For input sources, do the following:
 - a. Select an **Audio source** from the drop down list.
 - b. (Optional) Adjust the volume. Enter a value from 0 to 100 percent in the **Audio volume** field.
 - c. (Optional) Choose whether or not to display the audio meter from the **Audio meter** drop down.
 - d. If displaying the audio meter, select horizontal or vertical from the **Audio meter orientation** drop down to change the orientation of the displayed audio meter.



The screenshot shows the 'HDMI 1' Admin panel. Under the 'Settings' section, the following options are visible:

- Source: Input: HDMI-A
- Resolution: destination default
- Keep aspect ratio
- Mirrored
- Audio source: Input: HDMI-A Audio
- Audio volume: 100 %
- Audio meter: left top corner
- Audio meter orientation: horizontal

An 'Apply' button is located at the bottom of the settings panel.

5. Click **Apply**.

Display and reposition the audio VU meter

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



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

Configure the audio meter for the video output port using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).

- From the Output ports menu, click the output port (**HDMI 1**). The video output port configuration page opens.
- In the **Audio meter** field, choose an option.

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

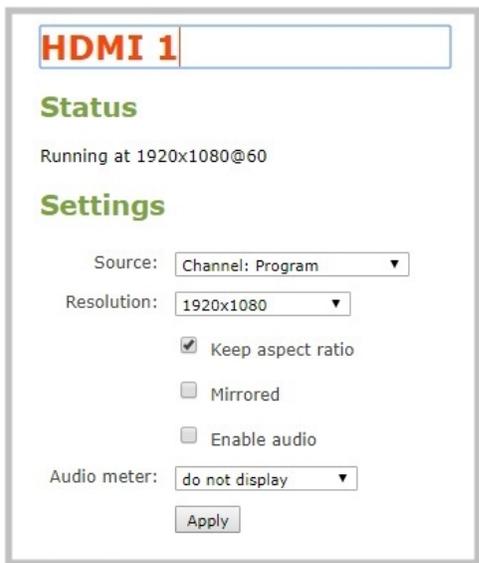
- If you've selected a location for the audio meter, you can also select an orientation (horizontal or vertical) in the **Audio meter orientation** field.
- Click **Apply**.

Rename a video output port

Using the Admin panel ([Admin panel](#)), you can easily change the video output port default name to something more suitable. For example, Projector Output or Confidence Monitor.

Change a video output port name using the Admin panel

- Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
- From the Output ports menu, click the video output port. The video output port configuration page opens.
- Select the **video output port name** at the top of the page and enter a new name using your keyboard. The text turns red when it's selected for editing.

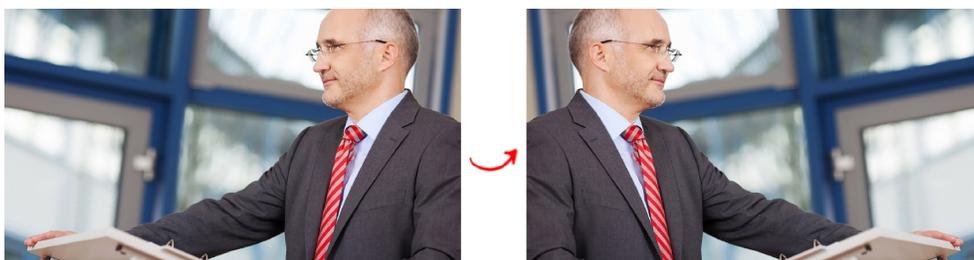


4. Press **Enter** using your keyboard to save the changes.

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

Mirror the video output port display

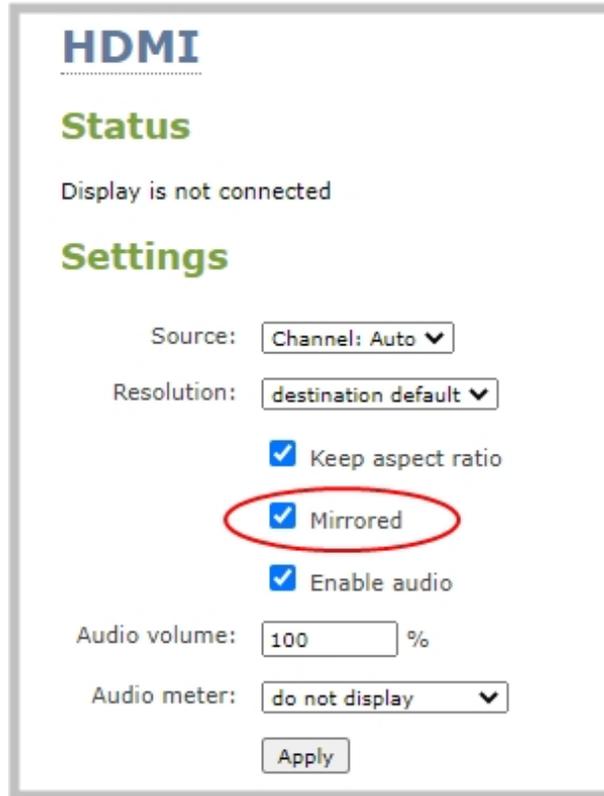
You can use the Admin panel to mirror the original video source on the output port so that it appears reversed on the connected display. If there's an on-screen image that includes text such as a custom no signal image, the text will appear reversed.



Mirror the video source at the video output port using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Output ports menu, click the output port you want to mirror. The video output port configuration page opens.

3. Check **Mirrored** to flip the video source's orientation on the display port. Uncheck **Mirrored** to display the video source in its original orientation, then select **Apply**



HDMI

Status

Display is not connected

Settings

Source: Channel: Auto ▼

Resolution: destination default ▼

Keep aspect ratio

Mirrored

Enable audio

Audio volume: 100 %

Audio meter: do not display ▼

Apply

Connect external devices

You can connect external devices to your Pearl Nano for control and monitoring.

Topics include:

- [Connect an external keyboard](#)
- [Connect a USB status light](#)
- [Connect a USB control button to control CMS events](#)

To connect an external monitor to your Pearl Nano for confidence monitoring, see [Video output ports](#).

Connect an external keyboard

Instead of using the built-in virtual keyboard on the Pearl device's screen, you can connect a USB keyboard to Pearl device and use that. Simply enable the external keyboard feature using the Admin panel and connect your keyboard directly to any available USB port.

You can change the keyboard layout to any of the supported languages. When multiple languages are selected, you can use **Ctrl+Shift** or **Ctrl+Alt** to toggle between languages.

- American English (default)
- Dutch
- French
- German
- Italian
- Netherlands
- Norwegian (Bokmal)
- Portuguese (European)
- Spanish (Spain)
- Swiss
- Russian

When an external keyboard is connected to the USB port, the **Lock Caps** key on the external keyboard controls both the external keyboard and the virtual keyboard.

Enable the external keyboard feature using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect an external keyboard](#).
2. From the Configuration menu, select **External keyboard**. The External keyboard configuration page opens.
3. In the **Keyboard application** drop-down menu, select **Touch screen(Front screen on Pearl Nano)**.
4. (Optional) Check a different keyboard language layout or multiple language layouts. The default layout is American English.
5. (Optional) Choose the keyboard key combination to toggle between keyboard layouts if multiple languages are selected: **Ctrl+Shift** or **Alt+Shift**.
6. Click **Apply**.

What's next?

Learn about keyboard shortcuts, see [External keyboard shortcuts](#).

Connect a USB status light

Pearl Nano supports connection of an external USB status light to visually indicate the status of recording and streaming. You can connect a USB status light directly to a USB port on the Pearl device.

The following USB status lights are supported:

- Kuando BusyLight models: UC Alpha and UC Omega
- Delcom Products USB HID single color and multicolor signal indicators

The status light is activated as soon as it is connected to a USB port on the Pearl device and flashes once.

Table 24 Status light indicator

Table 25 The default behavior of status lights is shown in the table below.

Light	Description
Solid off	The Pearl Nano is not currently recording or streaming.
Solid on	Recording or streaming is in progress.
Flashing	Rapid flashing (approximately five blinks per second) commences five minutes before a scheduled event begins. Slow flashing (approximately two blinks per second) indicates that an error occurred during recording or live streaming.

Starting in firmware version 4.23.1, for each state of Pearl, you will be able to select the color and status of light according to following table.

Pearl Nano state	Selectable color	selectable light status
Idle	Red, green, yellow, or blue	Disable (default), solid, slow pulse, or fast pulse
Recording	Red (default), green,	Solid (default), slow

Pearl Nano state	Selectable color	selectable light status
	yellow, or blue	pulse, fast pulse, or disabled
Streaming	Red (default), green, yellow, or blue	Solid (default), slow pulse, fast pulse, or disabled
CMS event is about to start	Red (default), green, yellow, or blue	Solid, slow pulse (default), fast pulse, or disabled
CMS event is running	Red (default), green, yellow, or blue	Solid (default), slow pulse, fast pulse, or disabled
CMS event is paused	Red (default), green, yellow, or blue	Solid, slow pulse (default), fast pulse, or disabled
CMS event is about to end	Red (default), green, yellow, or blue	Solid (default), slow pulse, fast pulse, or disabled
Error	Red (default), green, yellow, or blue	Solid (default), slow pulse, fast pulse, or disabled

Select color for on-air light status

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Configuration** menu, select USB Lights.
3. Select the color and light status for each state of your Pearl Nano

Connect a USB control button to control CMS events

Pearl Nano supports connection of an external USB control button to send an individual command. You can connect a USB control button directly to a USB port on the Pearl device.

List of currently supported commands. Please note, a button can only be configured to send a single command,

- **Confirm/Stop an Event**
- **Pause/Resume an Event**
- **Start/Stop/Pause/Resume an event**

The following USB control buttons are supported:

- [Delcom USB HID Programmable Single Button Switch, part number 706501](#)
- [Delcom USB HID Visual Signal Indicator with switch, part numbers 904023-S and 904025-S](#)

Starting in firmware version 4.24, you can program one of these buttons to send a **single** command to a Pearl device. You cannot configure a single button to send multiple commands.

Programming the Delcom USB HID Programmable Single Button Switch

1. Download, install and start the Delcom Software utility on a Windows computer.
2. Connect the Delcom USB Single Button switch to a USB port on the computer.
3. Within the Delcom setup utility, click the **Read Device** button.
4. Verify that the Delcom setup utility is able to successfully detect and read data from the attached USB button.

5. In the Button setup section of the setup utility, program BUTTON 1 of the switch with the following settings:
 - a. **TYPE:** KEYBOARD
 - b. **ACTION:**
 - a. Momentary - if only configuring the button for **pause/resume** or **confirm/stop event**
 - b. Hold/Repeat - if configuring the button for **start/pause/resume/stop event**
 - c. **CODE:**
 - a. 19 - Keyboard p and P - If configuring the button for **Pause/Unpause** or **Start/Stop/Pause/resume**
 - b. 22 - Keyboard s and S - If configuring the button for **Confirm/Stop Event**
 - d. **LED:** Off
 - e. **Init:** selected
6. Click **Program Device**.
7. Click **Yes**, when prompted to program the device.
8. Verify that the programming was successful.
9. Within the Delcom setup utility, click the **Read Device** button to verify the settings match those programmed.

To pause a Panopto, Opencast, or Yuja event that is in progress:

1. Attach the control button to one of the USB ports at the back of the Pearl.
2. When CMS event is in progress, the LED light on the Delcom button is turned on.
3. Press the button to pause the recording.
4. The LED light pulses to indicate that the CMS event is paused.
5. Press the button again to resume event.

To Confirm a Panopto, Opencast, or Yuja event:

1. Attach the control button to one of the USB ports at the back of the Pearl.
2. Before the CMS event begins, the LED light on the Delcom button is turned on.
3. Press the button to confirm the event.

4. The Event will begin as scheduled.
5. If needed you can press the button to stop the event early.

To start, stop, pause¹, resume a CMS event:

Follow the instructions in the table below to use the USB button to start, stop, pause, resume a CMS event

If Pearl	Then pressing the button will cause the Pearl to...
does not have an event in progress and has an event scheduled to start in 30 minutes	No Action: Recording will start at the scheduled time. Press and hold for 5 seconds or more: Starts the next scheduled recording immediately
does not have an event in progress and does not have an event scheduled to start in 30 minutes	Press and Hold of 5 seconds or more: Starts a 60 minute ad-hoc recording to the Remote Recorder's default folder ² .
has an event that is currently recording	Press and Release: Pause Recording or Press and Hold for 5 seconds or more: Stop Recording
has an event that is currently paused	Press and Release: Resume Recording or Press and Hold for 5 seconds or more: Stop Recording

¹Supported by Panoptp, Opencast and Yuja

²To start a Panopto ad hoc event, Pearl select **Default Folder** Upload destination menu and do not select user customizable ad-hoc events

Feature add-ons

Epiphan offers add-on features so you can do even more with your system. Pearl-2 and Pearl Nano currently offer feature add-ons for extra functionality.

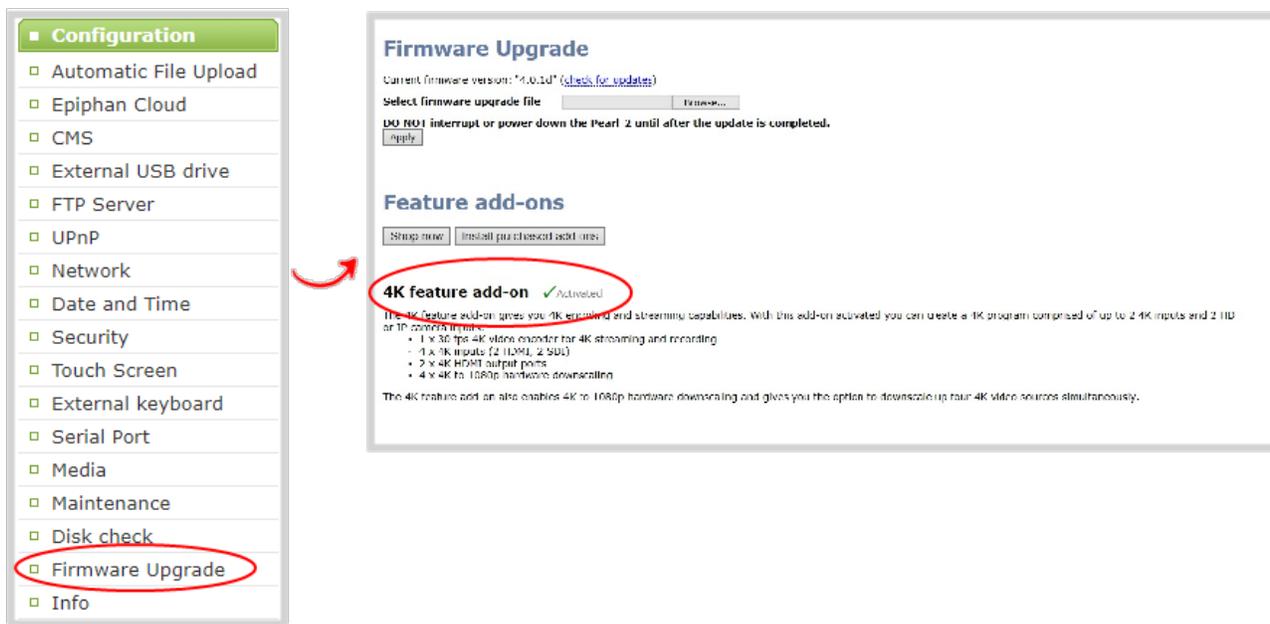
See [Add-ons overview](#) for details about the availability of add-ons for your system, as well as instructions to purchase and install add-ons.



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

Add-ons overview

Add-ons are listed in the Admin panel when you click [Firmware upgrade](#) from the Configuration menu.



The screenshot shows the Admin panel interface. On the left is a 'Configuration' menu with various options. The 'Firmware Upgrade' option is circled in red. On the right is the 'Firmware Upgrade' page, which includes a 'Feature add-ons' section. In this section, the '4K feature add-on' is listed with a green checkmark and the word 'Activated' next to it. This '4K feature add-on' entry is also circled in red. A red arrow points from the 'Firmware Upgrade' option in the Configuration menu to the 'Feature add-ons' section on the right page.

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

Purchase 4K add-on

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

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

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

Install purchased add-ons

Purchase the 4K feature add-on to enable that feature on Pearl-2 and Pearl Nano. Each purchased add-on can be installed and activated on a single device.

To install purchased add-ons:

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

Feature add-ons

4K feature add-on

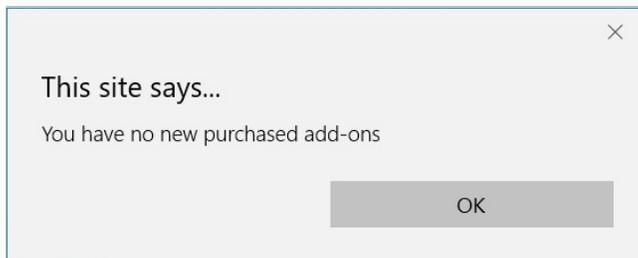
The 4K feature add-on gives you 4K encoding and streaming capabilities. With this add-on activated you can create a 4K program comprised of up to 2 4K inputs and 2 HD or IP camera inputs.

- 1 x 30 fps 4K video encoder for 4K streaming and recording
- 4 x 4K inputs (2 HDMI, 2 SDI)
- 2 x 4K HDMI output ports
- 4 x 4K to 1080p hardware downscaling

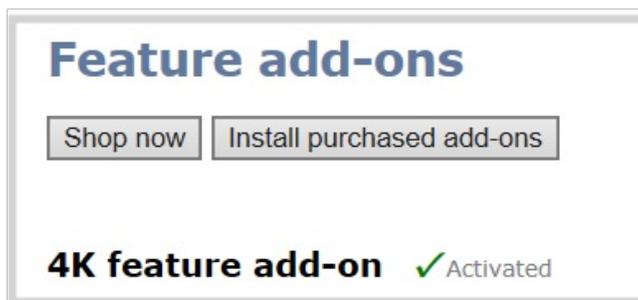
The 4K feature add-on also enables 4K to 1080p hardware downscaling and gives you the option to downscale up four 4K video sources simultaneously.



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



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



About 4K on Pearl Nano

Pearl Nano supports resolutions from low-res SD to 4K, which means that you can use it to capture 4K UHD digital signals. You need the 4K feature add-on to access this feature, see [Add-ons overview](#).

4K feature add-on

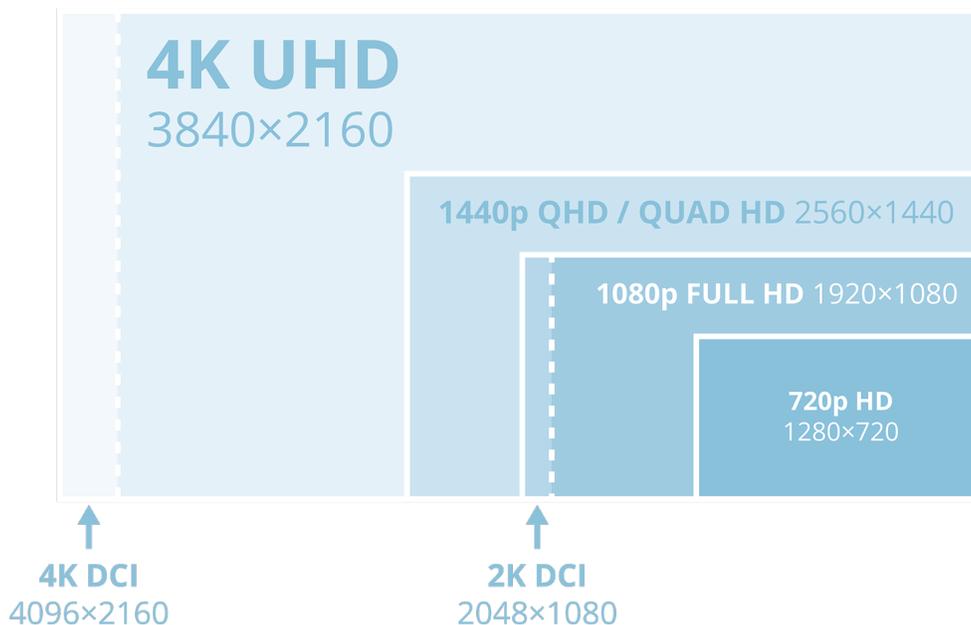
The 4K feature provides Pearl Nano with the following 4K features:

Specification	Pearl Nano
4K video inputs	2 (1 HDMI and 1 SDI)
4K Hardware scaling (4K down to full HD)	2
4K video outputs (HDMI)	1 pass through port
4K video encoding	1

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

4K UHD vs. DCI 4K

DCI 4K and 4K UHD are different definitions of a 4K resolution. 4K UHD (3840×2160) is the standard 4K resolution available on televisions and other common display screens. The 4K resolution of 4096×2160 is referred to as Digital Cinema Initiatives (DCI) 4K, and is the resolution used almost exclusively for cinematic scale film production. It is rare to find this resolution outside of a cinematic context. Pearl Nano is not capable of supporting input and output at DCI 4K and only supports standard 4K UHD with the 4K feature add-on.



User administration

Pearl Nano has different types user accounts. Depending on the type of user, you will have different privileges.

Topics include:

- [User types and privileges](#)
- [Change user passwords](#)
- [Overcome lost passwords](#)
- [Remove user password](#)
- [Log in using a different user account](#)
- [Assign administrator privileges to operators](#)

- [Configure LDAP user authentication](#)
- [Restrict viewers by IP address](#)

User types and privileges

There are different types of user accounts:

- Administrator
- Operator
- Viewer

No password is assigned to the user accounts by default. The first time you login to the Admin panel using the administrator-level account, you're prompted to set passwords for all three user accounts. The Pearl administrator can change passwords at any time using the Admin panel, see [Change user passwords](#).

You cannot change the default user names or disable user levels. When you log in to the Pearl device, you must log in as one of the three user levels. Private profiles with individually set passwords are not used.

Admin and operator-level users have access to the Admin panel to control the Pearl device. When logged in to the Admin panel, the user level is displayed at the top right corner of the screen.



Administrator

The administrator account is used for all system configuration and has full access to all configuration features with full access to the web-based Admin panel, local console, and remote log in access. The default user name used to log in to the Pearl device is **admin**.

Operator

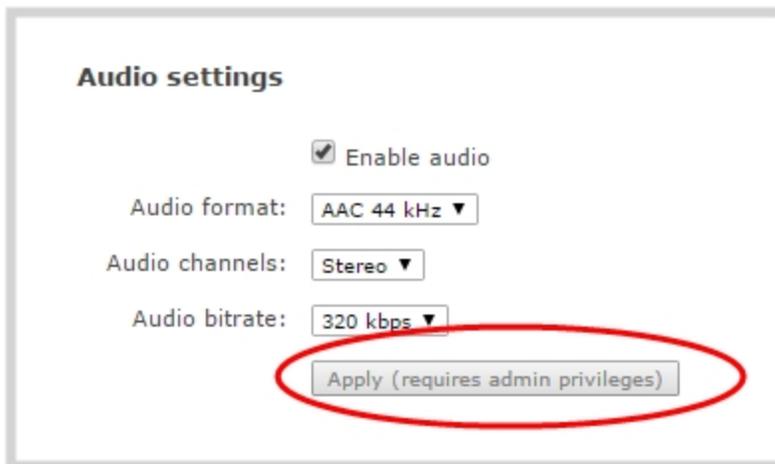
The **operator** account allows users limited configuration control with limited access to the web-based Admin panel, local console, and remote login access. The default user name used to log in to the Pearl device is **operator**.

Operators can do the following:

- Configure inputs
- Control recordings (start and stop)

- Rename, download and delete recordings
- Perform network diagnostics

If an operator does not have the privileges to apply a particular configuration in the Admin panel, the **Apply** button appears grayed-out in color and is not selectable. Administrators can grant operators permission to perform some administrator tasks, see [Assign administrator privileges to operators](#).



Viewer

The global **viewer** account is exclusively used to view streamed channels. You're prompted to enter the default user name **viewer** and password to view a channel's live broadcast.

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

User privileges

The following table outlines the default privileges for each user level. For administrator-level privileges that can be assign to operators, see [Assign administrator privileges to operators](#).

Table 26 User privileges in the Admin panel

Action or Menu Option	viewer	operator	admin
View channel output	✓	✓	✓
Channel Operations			
View channel configuration		✓	✓
Rename a channel			✓

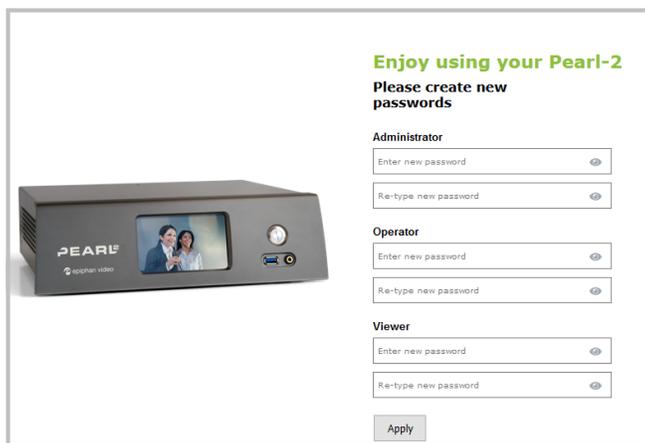
Action or Menu Option	viewer	operator	admin
Configure stream channel			✓
Configure stream sources			✓
Start/stop recording		✓	✓
Start/stop a stream		✓	✓
Configure channel metadata			✓
View recorded files list		✓	✓
Rename recorded files		✓	✓
Download recorded files		✓	✓
Delete recorded files		✓	✓
Input Source Operations			
View input source configuration		✓	✓
Rename input			✓
Configure input		✓	✓
View input snapshot		✓	✓
Network & security			
Configure static IP address			✓
Configure DHCP (including Option 81) and DDNS			✓
Change HTTP/HTTPS port values			✓
Configure 802.1x			✓
Configure HTTPS			✓
CMS Operations			
Start/stop scheduled events from the device screen	✓	✓	✓
Create ad hoc events from the touch	✓	✓	✓

Action or Menu Option	viewer	operator	admin
screen (Pearl-2 and Pearl Mini)			
Enable CMS and register			✓
Disable CMS or deregister			✓
Configure CMS settings and default event parameters			✓
Start/stop scheduled events (Admin panel)		✓	✓
Create ad hoc events (Admin panel)		✓	✓
View the Events page		✓	✓
System Configuration Operations			
View system configuration		✓	✓
Format the SD card (Pearl Mini and Pearl Nano)			✓
Configure Automatic File Upload (AFU)			✓
Select External USB drive behavior			✓
Cancel USB file transfers		✓	✓
Configure network address			✓
Configure date and time preferences			✓
Set or change user passwords			✓
Configure serial port flow control			✓
Upload and delete media			✓
Enable remote support			✓
Backup device configuration			✓
Restore device configuration			✓
Restore factory configuration			✓

Action or Menu Option	viewer	operator	admin
Reboot device (Admin panel)			✓
Enable/disable Epiphan Edge feature			✓
Upgrade Firmware			✓
View System Information		✓	✓
Network Diagnostics			
Bandwidth test		✓	✓
Connectivity status		✓	✓
Domain name resolution		✓	✓
Ping		✓	✓
Probe		✓	✓
Trace route		✓	✓

Change user passwords

The admin, operator and viewer-level user accounts have no assigned password by default. The first time you access the Admin panel using the administrator-level account you're prompted to set passwords for all the three user accounts. Record passwords somewhere safe for future reference.



Passwords are case sensitive and can include up to 64 alphanumeric characters within the ASCII range. Restricted characters include:

- spaces
- single quotes
- double quotes
- backslash

Contact your system administrator for your organization’s specific password requirements.

In addition to setting the viewer-level user account password, you can set access passwords and IP restrictions on a per channel basis from the channel's **Streaming** page, see [Restrict viewers by IP address](#).

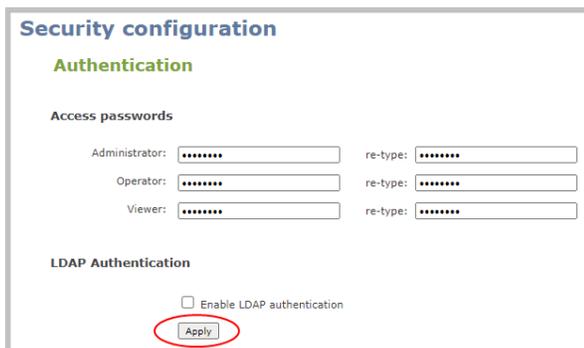
If you lose the admin password, see [Overcome lost passwords](#).

 Users are automatically logged out when a password changes. Viewers may need to refresh their browser window or press play in their media player.

 Change the admin password when there is no live stream in progress. Changing the admin password while live streaming disrupts the stream for viewer-level users.

Change a user account password using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Security**. The Security configuration page opens.
3. Under the Authentication section, delete the current password for a user account and enter a new password. Passwords are case sensitive.
4. Enter the identical password in **re-type** and click **Apply**.





You can set multiple account passwords before clicking **Apply**. If the passwords don't match, re-enter both passwords and try again.

If you're logged in when the password changes, you're automatically logged out and must log back in with the new password. If you add or change the viewer user's password, all channel streams pause for people watching the stream using the viewer account and must log back in using the new password.

Overcome lost passwords

If you have lost the password for the operator or viewer account, you can log in to the Admin panel and reset the password using the procedure described in [Change user passwords](#).

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

Alternatively, you can regain access to the Pearl device if you apply the factory default configuration preset using the device screen menu, see:

- [Pearl Nano - Apply a configuration preset using the front screen menu](#).

The factory default configuration will change the current settings on the Pearl device, see [The Factory default configuration preset and Factory reset](#). You can also perform a factory reset, see [Perform a factory reset](#).

Remove user password

After passwords are assigned to the three user account levels (admin, operator, and viewer), we do not recommend deleting them without setting a new password. To change passwords using the Admin panel, see [Change user passwords](#). If you don't remember the admin password, see [Overcome lost passwords](#).



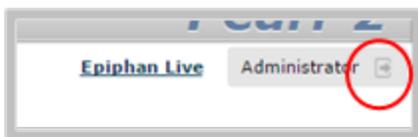
Changing the password while someone is logged into the account automatically logs out that user. If viewers are watching a broadcast when the viewer password is changed, they are automatically logged out. Viewers may need to refresh their browser window or press play in their media player to trigger the log in prompt.

Log in using a different user account

After you log in to the Admin panel as an Administrator or Operator, your browser remembers and automatically logs you in using the same user account the next time you log in to the Pearl device. You must log out of the Admin panel, then log back in using a different user account.

Log in using a different user account

1. In the Admin panel, select the logout icon at the top right corner of the screen. A new log in screen appears.



 Some browsers may require you to click twice before the you are logged out.

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

Assign administrator privileges to operators

Administrators can assign additional administrative-level privileges to operators from the Security menu in the Admin panel. The following table lists the available options and their associated privileges.

Table 27 Options with additional operator privileges

Option	Operator admin functions
Channel configuration	Pearl Nano - Rename a channel.
	Configure channel encoder settings
	Pearl Nano - Configure a custom layout for a channel
	Configure, remove, rename, and publish a stream for a channel
	Configure channel metadata
Upload, download, and delete media files	
Input configuration	Add and rename video and audio inputs

Option	Operator admin functions
Network configuration	Configure network address
	Configure 802.1x and manage CA certificates
	Enable and disable DHCP Option 81
	Configure Dynamic DNS (DDNS)
	Reboot the Pearl device.
Configuration presets control ¹	Create, delete, and apply configuration presets
System configuration	Configure the video output settings
	Enable CMS and register
	Disable CMS or deregister
	Configure CMS settings and default event parameters
	Configure Automatic File Upload (AFU)
	Select external USB drive behavior
	Configure the date and time preferences
	Configure the device screen
	Configure the serial port flow control
	Enable/disable Epiphan Edge feature for remote control and remote login
System maintenance	Apply configuration presets ²
	Upgrade firmware
	Enable remote support
	Reboot device (Admin panel)
	Restore factory configuration
	Configure the name, location, and description

¹Only configuration presets that don't include the System group are allowed.

²Allow operators to apply configuration presets that include the System group, as well as apply the factory default configuration preset.

Assign administrative privileges to operators using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Security**. The Security configuration page opens.
3. Under **Additional operator privileges**, check options to assign those administrator privileges to operators, and then click **Apply**.

Configure LDAP user authentication

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

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

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



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



For security reasons, you should configure passwords for the local accounts.

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.

Configure LDAP authentication using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).

2. From the Configuration menu, select **Security**. The Security configuration page opens.
3. In the **LDAP authentication** section, check **Enable LDAP authentication**. Uncheck the check box to disable LDAP authentication.
4. In the **Server address[:port]** field, enter the server IP address and (optional) port for your LDAP server. For example, 192.168.1.101:389.
5. In the **Connection encryption** drop-down, choose the type of encryption used by your LDAP server (if any is used).

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

6. In the **Bind DN** and **Bind password** fields, specify the fully qualified DN and password for LDAP bind. These fields are only needed if your LDAP server does not support anonymous binding.
7. In the **Base DN** field, specify the baseObject to search for entries. The system will search this object and the whole subtree starting at the base DN.
8. (Optional) By default the Authentication attribute is *uid*, which is suitable for a Unix environment. You can specify a different value in the **Authentication attribute** field, if needed. For Active Directory environments, specify *userPrincipalName*. The value of this attribute must be unique in the Base DN.
9. In the **Administrators (group DN)** field, specify the distinguished name of the group users must be part of to be logged in as the administrator. Users must have the *member* or *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).
10. In the **Operators (group DN)** field, specify the distinguished name of the group users must be part of to be logged in as the operator. Users must have the *member* or *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).

11. In the **Viewers (group DN)** field, specify the distinguished name of the group users must be part of to be logged in as a viewer. Users must have the *member* or *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).
12. Click **Apply**.

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

 To use \, \ or " characters as part of user name or password, escape them using \5C, 5C, and 22 respectively. The # character does not require to be escaped.

 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).

Restrict viewers by IP address

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

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

Table 28 IP Based Restriction Options

Item	Description
Allow IP's	<p>Users connecting from addresses in this list are permitted to view broadcasts from the device, 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	Users connecting from addresses in this list are not allowed to view broadcasts from

Item	Description
	<p>the device, 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>

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

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

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

If you're not familiar with creating allow/deny lists, see [IP restriction examples](#).



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

Restrict viewer access to watch streams on a channel by their IP address

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channels menu, select a channel and click **Streaming**. The channel's streaming configuration page opens.
3. From the **Stream access control** drop-down, select **Use these Settings** to enable local password and Allow/Deny IP lists are enabled.
4. (Optional) Enter a password for the viewer in the **Viewer Password** field.
5. Enter the allowed IP addresses or address ranges in the **Allow IP's** field and enter denied IP addresses or address ranges in the **Deny IP's** field. Separate addresses with a comma. To specify a range, use a hyphen (-). Optional spaces improve readability.
6. Click **Apply**.

IP restriction examples

The following table lists some sample allow lists.

Table 29 Example allow lists

Example	Description
<p>Allow list with distinct IP addresses</p>	<p>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.</p> <p>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:</p> <div style="border: 1px solid #ccc; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Allow: 192.168.1.50, 192.168.1.51, 192.168.1.75</p> </div>
<p>Allow list with a range of IP addresses</p>	<p>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:</p> <div style="border: 1px solid #ccc; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Allow: 192.168.1.200-192.168.1.250</p> </div> <p>Note that we could have specified two of the IP addresses in the previous example as a range.</p>
<p>Allow list with a range of IP addresses and one or more specific IP addresses</p>	<p>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:</p> <div style="border: 1px solid #ccc; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Allow: 192.168.1.200-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75</p> </div>

Example	Description
	Your list can have multiple ranges and multiple distinct IP addresses, provided they are separated by commas.
Allow list with a range of IP addresses, distinct IP addresses, and an exception	<p>Building on the previous examples, consider a situation where you want the CEO's computers (192.168.1.50, 192.168.1.51, 192.168.1.75) 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:</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p>Allow: 192.168.1.200-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75</p> <p>Deny: 192.168.1.211</p> </div> <p>Both lists can have multiple ranges and multiple distinct IP addresses, provided they are separated by commas.</p>

The following table lists some sample deny lists.

Table 30 Example deny lists

Example	Description
Deny list with distinct IP addresses	<p>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.</p> <p>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:</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p>Deny: 192.168.1.211</p> </div> <p>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.</p>
Deny list with a range of IP addresses	Consider a situation where you want every computer on the network to access the broadcast, with the exception of the CEO's desktop, laptop and

Example	Description
	<p>tablet computers. Additionally, boardroom computers should not be permitted with the exception of the cafeteria computer (IP address 192.168.1.222).</p> <p>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:</p> <div data-bbox="532 625 1448 835" style="border: 1px solid #ccc; padding: 10px;"><p>Allow: 192.168.1.1-192.168.1.250</p><p>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</p></div>

Configuration presets

Configuration presets are the perfect solution for backing up your system configuration so you can restore later when needed. They are also useful if you have changing configuration requirements for Pearl Nano or are managing multiple systems and you want them to have similar configurations.

Topics include:

- [About configuration presets](#)
- [Configuration preset considerations](#)
- [Configuration groups](#)
- [The Factory default configuration preset and Factory reset](#)
- [Create a configuration preset](#)
- [Apply a configuration preset using the Admin panel](#)
- [Apply a configuration preset using the front screen menu](#)
- [Export and import configuration presets](#)
- [Update a configuration preset](#)
- [Delete a configuration preset](#)

About configuration presets

Configuration presets are groups of settings that get applied to the system, leaving other important settings intact. They make it easy to manage multiple Pearl Nano setups in shared spaces, like a studio, and ensures a consistent setup each time you go to use Pearl Nano. You can even export a configuration preset and upload it to another Pearl Nano system.



Configuration presets are not cross compatible between different Pearl models or between Pearl systems and Unify projects.

The system's settings are divided into the following configuration groups. You can choose to include any number and combination of configuration groups in a preset and create as many different configuration presets as you need.

Pearlconfiguration group list

- System
- Network
- Inputs
- EDID
- Channel
- Automatic File Upload
- Content Management System
- Epiphan Edge
- Front screen
- Output port

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

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

Example of presets in action

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

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



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

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

Session 1 preset



Session 1 presenter data and background image

plus the conference IP address

Session 2 preset



Session 2 presenter data and background image

plus the conference IP address

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

Configuration preset considerations

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

- Access to presets and privacy considerations
- Recording and streaming states
- Recorded files in a channel
- The potential to lock the device screen

- Orphaned Kaltura resource registrations and duplicate resources
- and more

Access to presets and privacy considerations

- Recorded files are not removed when you apply a configuration preset. Any user with access to Pearl Nano has access to all the saved recordings, custom channel layout, etc that are associated with an applied configuration preset.
- Configuration presets can be overwritten and deleted without a password. Users who are logged in to the Admin panel can remove or change an existing configuration preset.
- Applying a configuration preset does not clear the settings from groups that aren't a part of the preset, which means user information is not private.
- Media and recorded files can be deleted, affecting more than just the currently applied configuration preset. Users can erase uploaded media or recordings that belong to other users.

Locking out the front screen on Pearl Nano

The **front screen** configuration group includes the PIN security setting for the front screen. It's possible to apply a preset that effectively locks out all further use of the front screen. If this happens, use the Admin panel to reset or disable the PIN, see [Set a PIN security code](#).

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Recording and streaming states

The channels (**single channel on Pearl Nano**) configuration group includes recording and streaming states for channels. This means that if a channel is streaming or a channel is recording at the time you create a configuration preset, the channel will immediately start recording (or streaming) whenever you apply that preset to the channel. Similarly, if a configuration preset is created when a channel is not recording (or streaming), applying that preset later won't cause the channel to start recording (or streaming).



This means a channel may stop recording or streaming as a result of applying the preset if the channel was actively recording or streaming before applying the preset.

Pearl Nano preset example

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

- If the channel is already recording, the file continues recording uninterrupted unless the recording file type in the applied preset is different. In that case, a new file is started and recording resumes using the new file.
- If the channel is not already recording, it immediately begins recording when the preset is applied.

Recorded files in a channel or recorder

A channel (and recorder) keeps a list of recordings in the **Recordings** section in the Admin panel. These files remain on the system even if the channel (or recorder) configuration is changed as a result of applying a configuration preset.

Pearl Nano example

If you delete any of the recordings, you are deleting the *only* instance of those files. For example, if you delete one of five recordings from the channel after creating a configuration preset, you'll find that even after applying the preset, the channel will still have only four recorded files.

Orphaned Kaltura resource registrations and duplicate resources

Returning the Pearl device to the factory defaults using the factory default configuration preset or performing a factory reset does not delete the registered resource instance in Kaltura CMS. In that case, you can reregister your Pearl device using the same resource name and take over for the resource instance that is still registered in Kaltura, see [Reassign a registered resource](#).

If you apply a configuration preset to set up a replacement Pearl device with the settings from a Pearl device that is currently registered with Kaltura, the replacement Pearl device assumes the identity of the registered resource. However, you risk having two active Pearl device resources with the same identity, which can effect recording and the content that's uploaded to Kaltura for scheduled events.

To remove the risk of having two active devices with the same registered resource identity in Kaltura, we recommend powering down one of the Pearl device resources, then disconnect it from the network and consider performing a factory reset or applying the factory default configuration preset.

Configuration groups

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

Table 31 Configuration group definitions

Group Name	Settings included in the configuration group
System	Date and time settings, serial port settings, remote support settings, custom disk check schedule, access passwords, LDAP configuration settings, and deny/allow lists.
Network	Network settings.
Inputs	All audio and video source configuration settings (including no signal images) except EDID settings, which are in their own group.
EDID	EDID settings for sources. Applying configuration presets with this group automatically applies the included EDIDs. This process can take a while.
Channel(s)	All channel configuration data and current recording state, all layouts) images used in layouts, streaming state, all recording configuration data and current recording state.

Group Name	Settings included in the configuration group
AFU	Automatic file upload type, parameters and schedules. SFTP/SCP private keys are included (in encrypted format) in the automatic file upload preset.
CMS	Include CMS settings for integrations.
Epiphan Edge	Epiphan Edge pairing and encoder selection information.
Pearl Nano - Front screen	Front screen PIN settings.
Output ports	All configuration settings for the output ports.

The Factory default configuration preset and Factory reset

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

Table 32 Factory default configuration preset vs a factory reset

Item	Factory default configuration preset	Factory reset function
Resets the channel settings	✓	✓
Deletes all recorded files in the channels (Pearl Nano has a single channel)		✓
Resets network configuration	✓	✓
Resets front screen PIN	✓	✓
Resets user passwords	✓	✓
Deletes all created configuration presets		✓
Removes all CMS including Epiphan Edgeregistration information	✓	✓
Removes records for all scheduled and	✓	✓

Item	Factory default configuration preset	Factory reset function
completed CMS events		
Deletes all uploaded media files		✓
Resets all Source settings	✓	✓
Resets EDID to factory	✓	✓
Deletes all SCP/SFTP identities	✓	✓
Deletes all LDAP settings	✓	✓
Deletes all Automatic file upload settings	✓	✓

There are different ways you can apply the **Factory default** configuration preset to the Pearl device, you can:

- Using the admin panel, see: [Apply a configuration preset using the Admin panel](#).
- Using the front screen, see: [Apply a configuration preset using the front screen menu](#).

A reboot is required to apply the factory default configuration preset.

To perform a factory reset, see [Perform a factory reset](#).

Operators who are assigned certain administrative-level privileges can apply the Factory default configuration preset and perform a factory reset, see [Assign administrator privileges to operators](#).



Returning the Pearl device to the factory defaults or performing a factory reset does not delete the registered resource instance in Kaltura CMS. You can reregister your Pearl device using the same resource name and take over for the resource instance that is still registered in Kaltura, see [Reassign a registered resource](#).

Create a configuration preset

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



Before creating and using a configuration preset, read [Configuration preset considerations](#).

For each configuration preset you create, you get to name the preset and choose which groups of settings to include. See [Configuration groups](#) for which settings are included in each group.

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

Configuration presets for Pearl Nano that include **network** or **system** settings require a system restart when applied.

Important considerations

- Configuration preset file names should be unique and should not contain # or + symbols.
- If you try to save a configuration preset but one or more of the related image files is missing, an error message is displayed. You'll be unable to save the preset until the missing files are restored or the layouts referencing the missing files are modified to remove the bad references.
- If you try to save a configuration preset but there isn't enough space, an error message is displayed. You'll need to delete some presets before proceeding.

Create a configuration preset using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Maintenance** . The maintenance page opens.
3. Under **Create a configuration preset**, enter a name for your configuration preset in the **Name** field. Configuration preset file names should be unique and should not contain # or + symbols.
4. Check the configuration groups you want to include in the preset. For a full system backup, select all groups.



After a configuration preset has been created, you can select which sections of the configuration preset to apply. For more information, see [Apply a configuration preset using the Admin panel](#).

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

Apply a configuration preset using the Admin panel

When you apply a configuration preset, the system settings for all included configuration groups are updated. Other settings on the system are not affected. For example if you apply a preset that includes the configuration groups channels (single channel on Nano) 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.

Apply a configuration preset using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Maintenance**. The maintenance page opens.
3. In the **Configuration presets** section, select which sections of the configuration you wish to apply. For example, if you have imported a configuration preset and don't want to apply the Network section, clear the **Network** check box for the configuration preset. If you want to apply all of the sections, skip to the next step.
4. Click **Apply selected** below the configuration preset you want to apply.
5. Click **OK** when prompted. The Pearl Nano reboots automatically if the configuration preset includes the **network** or **system** configuration groups.

Apply a configuration preset using the front screen menu

You can use Pearl Nano's front screen menu to apply configuration presets that are either stored locally on the internal storage of Pearl or from a USB drive that is attached to a USB port on Pearl. See below for instructions on how to prepare the USB drive and use it to apply a configuration preset to your Pearl.. Configuration presets that only contain the **network** configuration group can also be applied using an alternative method, which is also described in this procedure.

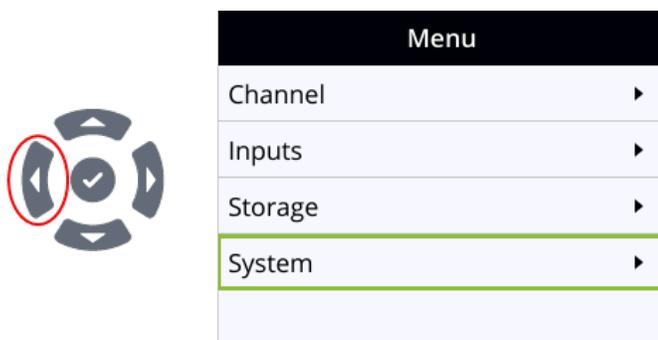
If you apply a preset that has the EDID configuration group, the system may appear unresponsive for a short time while it applies these EDIDs to the video grabbers.

Prepare USB drive and use it to apply a configuration preset

1. Make sure that USB drive is formatted with either FAT, exFAT, ext2 or ext4
2. Connect the USB drive to a computer.
3. Change the USB drive label to 'EPIPHAN'. In majority of operating systems, this is usually performed by right clicking on the USB drive and select the rename option.
4. Create a folder called 'EPIPHAN' as a top level level folder.
5. Copy one or more Pearl Configuration Presets to the EPIPHAN folder created in the previous step.
6. Safely eject the USB drive from your computer.
7. Connect the Maintenance USB drive to one of the USB ports on your Pearl.

Apply a configuration preset using the front screen menu

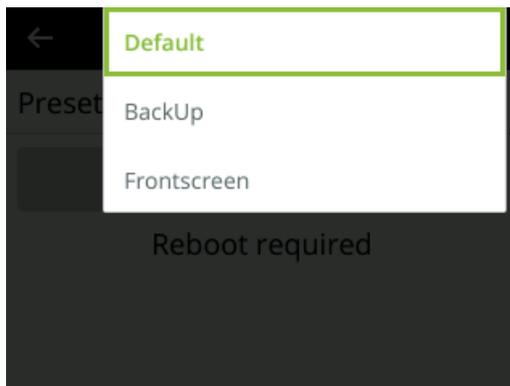
1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



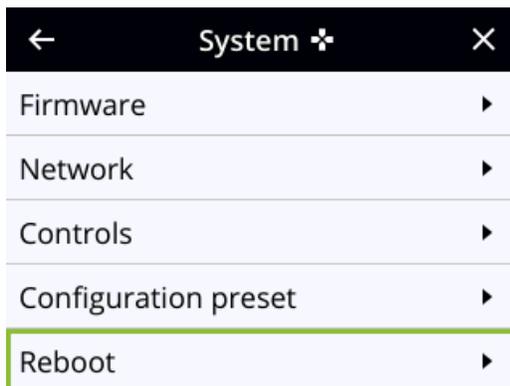
2. Use the arrow and check mark keys to select **System**. Then from the System screen, scroll down using the arrow key and select **Configuration preset** to open the Configuration preset screen.



3. If a specially prepared USB drive that contains a Pearl Nano configuration preset is attached to the USB port, use the arrow and check mark to change between the USB drive or internal storage to see available presets on either storage device.
4. From the Configuration preset screen, highlight **Preset** and press the **check mark** key to expand the list of available presets, then use the arrow keys to highlight the name of the preset you want. Press the **check mark** key to select it.



5. From the Configuration preset screen, use the down arrow key to highlight **Apply** and press the **check mark** key to apply the selected configuration preset. The selected configuration preset is shown in the Preset field of the Configuration preset screen.
6. If prompted, reboot Pearl Nano to apply the configuration preset. Return to the System screen and use the down arrow key to scroll down until Reboot appears. Then select **Reboot** using the **check mark** key and select **Reboot now** when prompted.



Export and import configuration presets

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

Before you begin

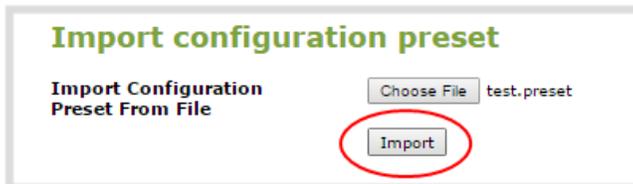
- Read [Configuration preset considerations](#).
- Configuration presets are not cross compatible between different Pearl models or between Pearl systems and Unify projects.
- You cannot download/upload configuration presets using the local console on the Pearl Nano. Use the web-based Admin panel instead.

Download or export a configuration preset using the Admin panel

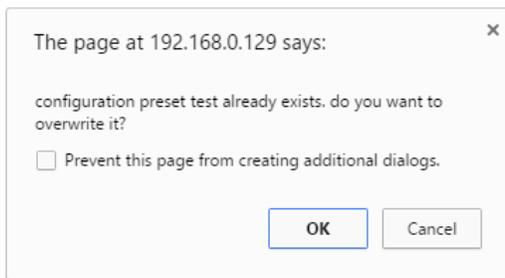
1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, Click **Maintenance** . The maintenance page opens.
3. In the **Configuration presets** section, click the **Download** button next to the configuration preset you want to export. The configuration preset file (with extension `.preset`) is saved to your admin workstation (in your browser's download folder).

Import a configuration preset using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Maintenance**. The maintenance page opens.
3. In the **Import configuration preset** section, click **Choose file** and select the file you want to upload (with the extension `.preset`), then click **OK**.
4. Click **Import**.



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



What's next

After you upload a configuration preset file, you must apply the configuration preset to Pearl Nano. You can apply the configuration preset using the admin panel. See [Apply a configuration preset using the Admin panel](#).

You can also apply the configuration preset using the front screen of Pearl Nano, see: [Apply a configuration preset using the front screen menu](#).

Update a configuration preset

To update a configuration preset, or add/remove different configuration groups from the preset using the Admin panel, use the following procedure:

Update a configuration preset using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Maintenance**. The maintenance page opens. All existing configuration presets are listed in the **Configuration presets** section.
3. Copy the name of the preset you want into the **Name** field and select the configuration groups to include, then click **Save**.
4. Click **OK** when prompted to overwrite the existing configuration preset with the new one.

Delete a configuration preset

You can delete individual configuration presets from the **Maintenance** page in the Admin panel.

Delete a configuration preset using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Maintenance**. The maintenance page opens.
3. Click **Delete** beside the configuration preset that you want to delete, and then click **OK** when prompted.

Pearl Nano can delete all configuration presets at once by doing a factory reset. You cannot delete the built-in configuration presets.

Status and monitoring

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

Topics include:

- [Monitoring audio](#)
- [Confidence monitoring using the front screen](#)
- [View system status using the front screen menu](#)
- [View system information using the Admin panel](#)
- [View network status](#)
- [View 802.1x network connection status](#)
- [View channel status and stream information](#)
- [View the video output port status](#)
- [View AFU and file transfer progress](#)
- [View scheduled CMS events and history](#)

For a description of the front panel LEDs on Pearl Nano, see [Front and back view of Pearl Nano](#).

Monitoring audio and VU sensitivity

You can connect headphones to the 3.5 mm audio jack on the front panel of Pearl Nano and monitor audio for the channel. To monitor audio for the channel, make sure the Channel view is displaying on the front screen. The audio you hear depends on the channel's custom layout. That's because you can choose different audio sources on the custom layout. To monitor audio for a specific video source, make sure the screen for the video source is displaying on the front screen.

To adjust the headphone volume, use the up and down arrow keys on the control key interface when the Channel view or one of the video sources is displayed on the front screen. See [Monitoring audio](#) for details.

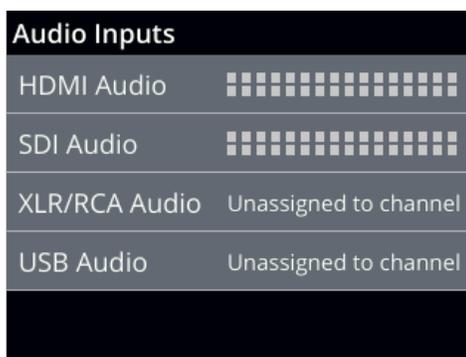


A VU meter on the front screen shows the audio levels for the channel. The value is displayed in dBFS (decibels relative to full scale). Colored bars represent the audio level.

Table 33 Audio VU meter levels

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

You can also monitor the audio VU meters for all audio inputs from the Audio inputs screen. If you don't see the Audio inputs screen displayed on the front screen, press the **left arrow** key on the control key interface to cycle through the different views.



Confidence monitoring using the front screen

Have complete confidence about what you're capturing, streaming, and recording. The Channel view displays your video sources in a custom layout that you can configure using the custom layout editor.

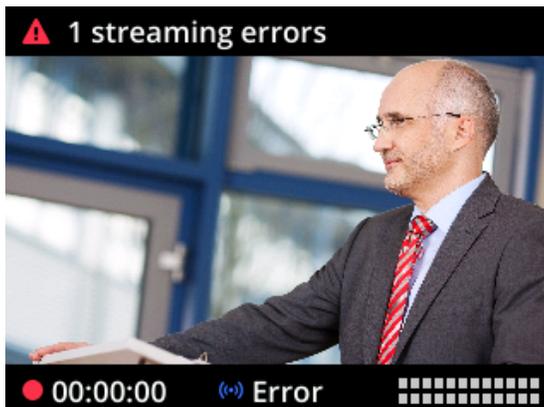
The Channel view opens by default when you turn on Pearl Nano. If you don't see the Channel view displayed on the front screen, press the **left arrow** key (or the right arrow key) on the control key interface to cycle through the different views.



The audio VU meter uses quasi-peak ballistics with samples averaged every 10 ms. The maximum average audio level in each 100 ms period is displayed using colored bars.

- RED = 0 to -9 dBFS
- Yellow = -9 to -18 dBFS
- Green = -18 dBFS and lower

If an error occurs while streaming or recording, an error message appears in the header bar and the word **Error** replaces the related timer in the footer. At the same time, the Stream (or Record) control key on the front panel of Pearl Nano visibly flashes.



You can also monitor a specific video input from the front screen. If you don't see the video input displayed on the front screen, press the **left arrow** key on the control key interface to cycle through the different views. If the video input source has no video signal, the no signal screen displays.



To monitor a different video input or return to the Channel view, press the **left arrow** key on the control key interface to cycle through the different views. To toggle the content displayed in the header and footer bars on and off, press the **check mark** key on the control key interface.

For information about monitoring audio, see [Monitoring audio and VU sensitivity](#).

View system status using the front screen menu

Find the serial number, check the installed firmware version of Pearl Nano and more on the System Status screen using the front screen and control key interface.

The System Status screen displays basic system information that's useful when first setting up your Pearl Nano. If you don't see the System status screen displayed on the front screen, press the **left arrow** key on the control key interface to cycle through the different views.

System status	
IP address	10.113.1.101
Firmware	4.14.0i
Uptime	07:22
CPU load	9%
SD card	111 GB of 111 GB
USB storage	Not detected

Table 34 System status parameters

Label	Description
IP address	The IP address assigned to Pearl Nano. Use

Label	Description
	this IP address to connect to the Admin panel. To setup networking, see Configure network settings .
Firmware	The firmware that is currently loaded on Pearl Nano.
Uptime	How long Pearl Nano has been powered on displayed as hh:mm .
CPU load	The current amount of CPU load (%).
SD card or SSD	The amount of storage available. SD card only displays if a SATA M.2 2280 SSD is not installed. When an SSD is installed, the field displays SSD instead of SD card.
USB storage	Displays the amount of storage available on a USB storage device that is connected to Pearl Nano.

View system information using the Admin panel

Get useful information about Pearl Nano on the Info page from the Configuration menu. You can view your current firmware level, the system hardware version (if available), and currently configured settings for a channel.

View system information using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Info**. The system information page opens.



The Bitrate / Actual bitrate values show the total of the video bitrate plus audio bitrate.

View network status

Get useful status information about Pearl Nano network connection from the Network configuration page using the Admin panel, including:

- Connectivity state of the built-in Ethernet port
- IP address of the built-in Ethernet interface
- Hostname
- Rated Ethernet link speed (Mbps)
- Sending and receiving speed (Mbps)
- MAC address
- 802.1x status

View the network status using the Admin panel

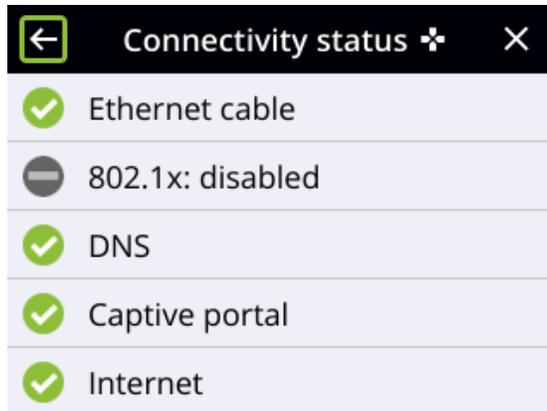
1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Network**. The Network configuration page opens.

View 802.1x network connection status

View the 802.1x network connection status in the following locations:

- the Connectivity status diagnostic in the Admin panel
- the front screen menu on Pearl Nano when you select **System > Network > Connectivity Status**.

The status can display as either passed, failed, or disabled.



If you attempt to connect to a network that isn't 802.1x enabled when 802.1x is configured on Pearl Nano, a consistent **802.1x status: failed** status message appears on the Network Configuration page in the Admin panel.

For more information about the Connectivity status diagnostics, see [Diagnostic tools](#).

View channel status and stream information

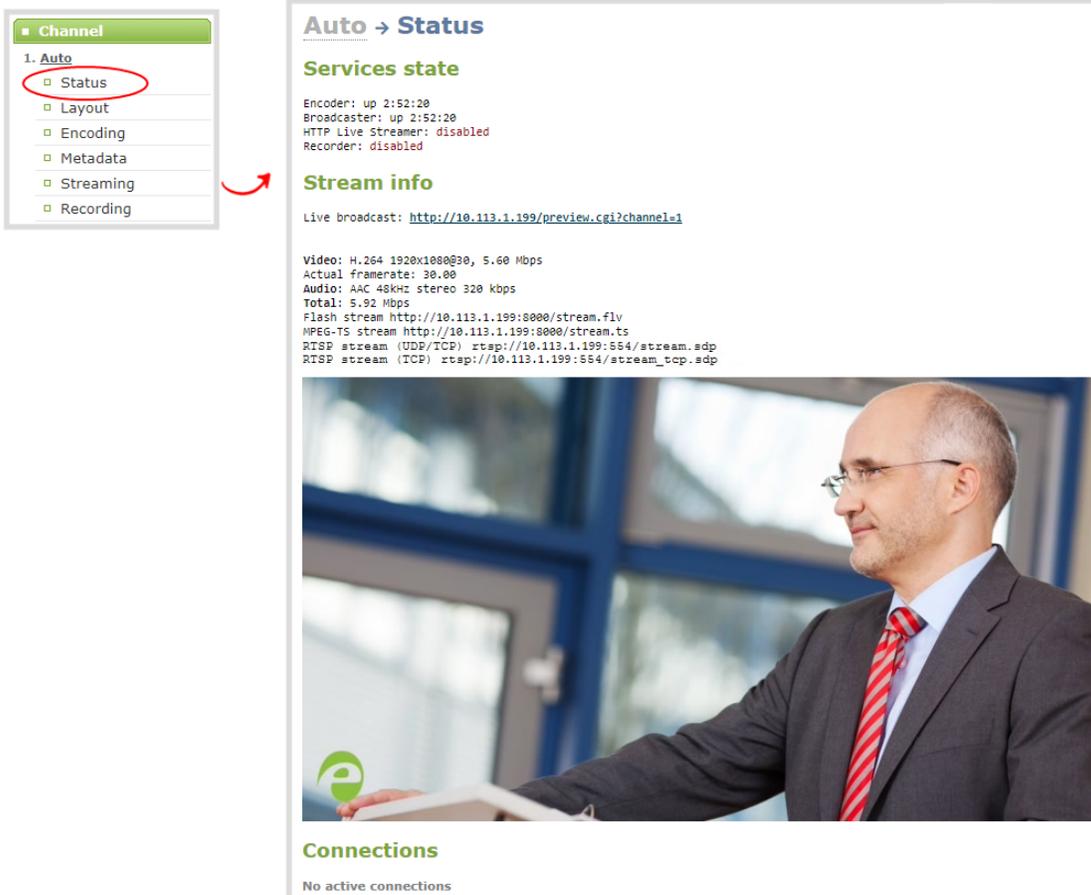
You can see information about the status of a channel on Pearl Nano from the channel's status page using the Admin panel, including:

- The status and uptime of encoder services
- Stream information and URLs
- Channel preview
- Active network connections

More encoder information can be found on the Info page from the Configuration menu, see [View system information using the Admin panel](#).

View the status information for a channel using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channels menu, click a channel to open the status page for that channel.



Channel

- 1. Auto
 - Status
 - Layout
 - Encoding
 - Metadata
 - Streaming
 - Recording

Auto -> Status

Services state

Encoder: up 2:52:20
Broadcaster: up 2:52:20
HTTP Live Streamer: disabled
Recorder: disabled

Stream info

Live broadcast: <http://10.113.1.199/preview.cgi?channel=1>

Video: H.264 1920x1080@30, 5.60 Mbps
Actual framerate: 30.00
Audio: AAC 48KHz stereo 320 kbps
Total: 5.92 Mbps
Flash stream <http://10.113.1.199:8000/stream.flv>
MPEG-TS stream <http://10.113.1.199:8000/stream.ts>
RTSP stream (UDP/TCP) <rtsp://10.113.1.199:554/stream.sdp>
RTSP stream (TCP) rtsp://10.113.1.199:554/stream_tcp.sdp

Connections

No active connections

Active unicast and multicast stream information displays under **Connections**.

Connections			
Stream name	Client IP	Bitrate	Bytes transmitted
stream.sdp	192.168.114.115	5868 kbps	221879 KBytes
	192.160.110.105	0 kbps	2 KBytes
stream.ts	192.165.154.211	6491 kbps	385166 KBytes
stream.flv	192.168.114.219	5916 kbps	321166 KBytes
Stream 1	a.rtmp.youtube.com	2669 kbps	47749 KBytes

View the video output port status

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

View the video output port status using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Output port(s)** menu, click the output port. The video output port configuration page opens.

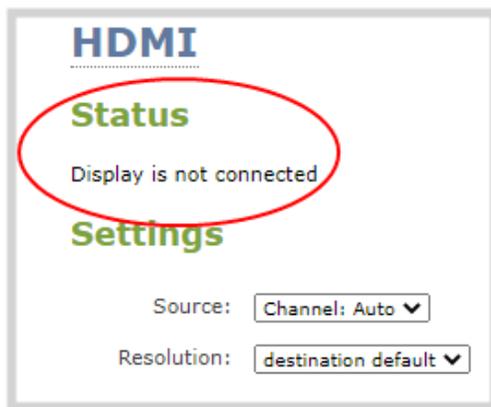


Table 35 Possible video output status messages

Message	Description
Disabled	This video output port is disabled in the configuration.
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 source that no longer exists. Change the source. see Select the video output source using the device screen .
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.

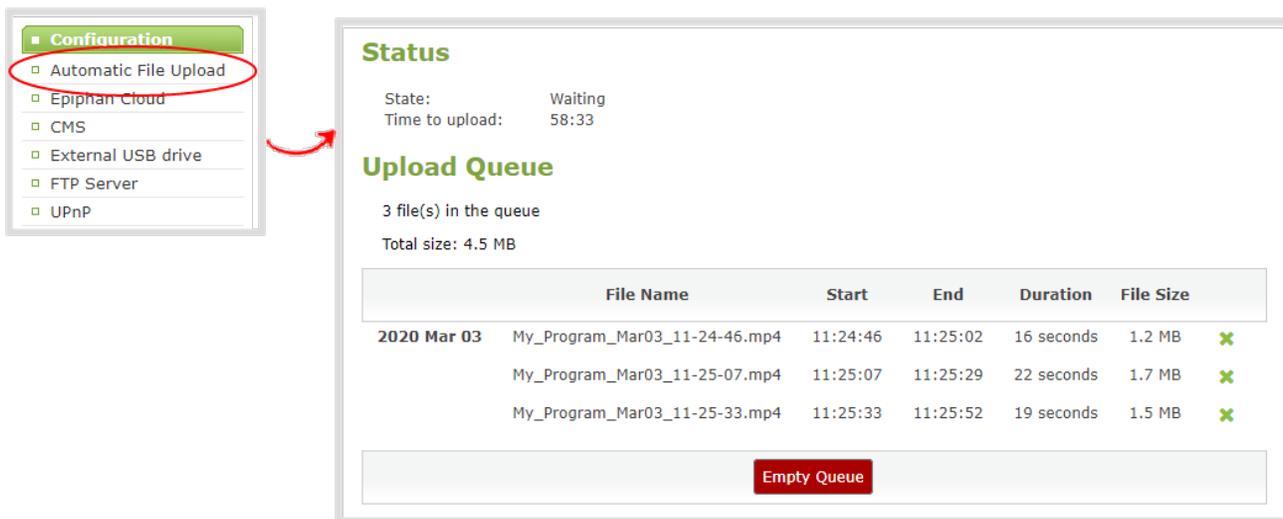
View AFU and file transfer progress

You can view Automatic File Upload (AFU) and file transfer information from the following places:

- the Admin panel.
- front screen menu on Pearl Nano

View file transfer status using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Automatic File Upload**. If there are files to be uploaded, they appear in the queue.



View File transfer status using the Pearl Nano front screen menu

1. Enable configure and enable Automatic File transfer or configure Pearl system to manually move or copy recorded files to an inserted USB drive. A file upload indicator icon is shown on the video preview screens of Pearl system and on the front screen of Pearl Nano. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



- 2. The background of the file upload indicator icon blinks green when Pearl system is actively uploading files to the external destination.



- 3. The background color of the file transfer indicator alternates between blinks yellow when Pearl system encounters an error while uploading files to the external destination.



To see details of the error, from the File transfer screen, do one of the following:

- a. Use the arrow keys to highlight **Automatic File Upload** and press the **check mark** key to view the AFU progress.

Automatic File Upload	
Protocol	FTP
Queue	1 file (9 MB)

- b. Use the arrow keys to highlight **Copy to USB drive** and press the **check mark** key to view the Copy to USB drive progress.

Copy to USB drive	
Queue	9 files (207 MB)
Time remaining	00:00:26
Storage remaining	29 GB of 29 GB

View scheduled CMS events and history

Using the Admin panel, select the **Events** menu to see up to 90 days of upcoming scheduled events and up to 90 days of ongoing and completed events for Pearl Nano. Click the page arrows at the bottom of each list to navigate through multiple pages.

Events

Last updated 07:13, 2019-10-08

Not logged in

Refresh schedule

Create new event

Ongoing and completed events

Event	Name	Type	Status
2018-11-15 14:00-14:57	Epiphan U Session 12	VOD	Recording 00:14:25 <input type="button" value="Stop"/>
2018-11-14 14:00-14:57	Epiphan U Session 11	VOD	Complete
2018-11-14 12:05-12:10	Nov 14 live event	Live-stream	Complete
2018-11-13 14:00-14:57	Epiphan U Session 10	VOD	Complete
2018-11-13 12:05-12:10	Nov 13 live event	Live-stream	Complete

Page 1 of 2

Scheduled events

Event	Name	Type
2018-11-15 15:00-15:57	Epiphan U Session 13	VOD

Page 1 of 1

The Events page updates to show new events every hour. Click **Refresh schedule** at any time to manually update the Events page. The Events page only displays when a CMS is enabled on Pearl Nano.



If the time and zone settings of Pearl Nano are out of synchronization with Kaltura's scheduling server, an error appears on the Events page when you refresh the schedule. Configure the time settings on Pearl Nano to match the time and zone of Kaltura's scheduling server, see **Configure date and time**.

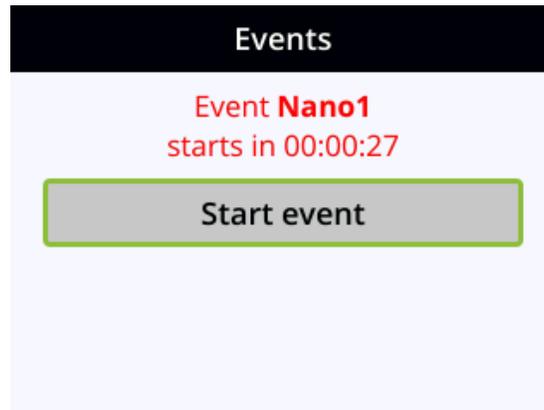
When CMS is enabled on Pearl Nano, an Events screen is added to the screens you can view on the front screen. If you don't see the Events screen on the front screen, press the **left arrow** key (or the right arrow key) on the control key interface to cycle through the different views.



Events

No events are scheduled.

When an event is scheduled, the Event screen updates with the event name and a countdown timer. Five minutes before the scheduled event, the event name and timer on the Events screen turn red.



Capture

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

This section covers how to set up a channel and customize the layout so that you can capture, stream, and record exactly what you want - how you want! Whether that's a simple channel with a single video and audio source or multiple video and audio sources in a custom, picture in picture layout.

Topics include:

- [What is a channel?](#)
- [Channel layout examples](#)
- [Channel configuration](#)
- [Custom layout configuration](#)
- [Video and audio input sources](#)

What is a channel?

A channel is an encoding instance associated with your video and audio inputs to produce video recordings and/or live streams. Your video and audio sources can be combined and added to a channel, which you can stream and record.

- **Pearl Nano** - has a single channel already preconfigured as an Auto channel by default.
 - As soon as you connect a video source to one of the video input ports, it appears automatically in the channel's custom layout. For information about video inputs and signal priority when using Auto channels, see [About automatic channels](#).
 - If you connect an HDMI video source to the HDMI IN port, the Auto channel automatically uses the HDMI video and embedded HDMI audio.
 - If you connect an SDI video source to the SDI port, the Auto channel automatically uses the SDI video and embedded SDI audio.
 - If both HDMI and SDI video sources are connected, the HDMI video source and embedded audio takes priority and is used in the Auto channel by default.
 - If no video sources are connected, a standard No Signal screen displays.
 - The Auto channel's frame size is set to match the video source by default and the best bit rate for the default frame rate of 30 fps is applied automatically.
 - Changing the channel's frame rate will change the frame rate used at the output port for that video input.

Default auto channels have the related HDMI port selected by default. As soon as you connect your video source to the port, it appears automatically in the channel's custom layout. Changing the channel's frame rate or deleting the channel will change the frame rate used at the output port for that video input. Deleting the channel forces the video output port to use the original frame rate of the video input source.

Channel layout examples

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

In the Epiphan products column, "All" means the layout can be created with Pearl-2, Pearl Mini, Pearl Nano, and Epiphan Unify. Pearl Nano does not support multiple channel layouts.

Layout example	Epiphan products	Description
 <p>epiphan video capture • stream • record</p> <p>Virtual Labs and Tutorials</p> <p>Virtual Labs/Tutorials</p> <ul style="list-style-type: none"> • Provide a complete view of the lab or tutorial • Share multiple devices in real time • Include cameras, laptops, oscilloscopes, microscopes <p>Simple Integration with Web Conferencing Systems</p> <ul style="list-style-type: none"> • Use standard web conferencing software and easily share your lab equipment with the participants • Simple sharing via Skype, GoToMeeting, Google Hangouts, YouTube Live, Vidyo, Adobe Connect and many others. 	<p>All</p>	<p>One video source (a slideshow presentation in this case), at the full size of the channel.</p> <p>To get this look: Using the custom layout editor, add one video source to the layout, select keep aspect ratio and stretch to fill the entire layout area.</p>
	<p>All</p>	<p>One video source with a logo (.png with transparency) in the bottom left corner.</p> <p>To get this look: Upload an image with transparency. Using the custom layout editor, add one video source to the layout, select keep aspect ratio and stretch to fill the entire layout area. Then, add the image to the layout and drag it where you want it to appear on screen.</p>
	<p>All</p>	<p>One source with a text overlay in the bottom right corner.</p> <p>To get this look: Using the custom layout editor, add one video source to the layout, select keep aspect ratio and stretch to fill the entire layout area. Then, add a text overlay to the layout and drag it where you want it to appear on screen.</p>

Layout example	Epiphan products	Description
	<p>All</p>	<p>One video source (a slideshow presentation in this case), with a green background matte.</p> <p>To get this look: Using the custom layout editor, select a background color. Add a video source to the layout and size appropriately, leaving the background matte visible.</p>
	<p>All</p>	<p>Two video sources (a slideshow and a presenter cropped to a new aspect ratio using the tool to Crop a video source), a background image, and a logo.</p> <p>Make sure the background image has the correct aspect ratio.</p> <p>To get this look: Upload your background and logo images (you can do this from the Media page or the Layouts page for the channel). Using the custom layout editor, add the background image to the layout and stretch it to fill the entire layout area. Then add your two video sources to the layout, adjusting their size and position as needed. Lastly, add the logo to the layout and move it in to position. For the second video source, use the Crop tool to crop the second source to a square aspect ratio.</p>

About automatic channels

Pearl Nano

To get you started as quickly as possible, Pearl Nano comes pre-configured with an automatic channel called Auto. Simply plug a source into one of the video inputs and Pearl Nano automatically configures the channel's frame size to match the source resolution and configures a frame rate and bitrate. The detected video source's audio is also automatically added to the channel.



Embedded audio from a DVI source that is connected to the HDMI input using an adapter is not detected on automatic channels. You must manually add the audio to the channel's layout using the custom layout editor.

You can start viewing the automatic channel immediately on the device screen or using a web browser on the same local network as the Pearl device. Browse to the following URL:

Pearl Nano

```
http://<serial>.local/preview.cgi?channel=1
```

For example: `http://d560515f.local/preview.cgi?channel=1`

If Bonjour services, which permits browsing by serial number, are not installed on your admin computer, you can get the IP address of your Pearl device by doing the following:

Pearl Nano

Use the front screen to select System status screen and browse to:

```
http://<IP Address for Pearl Nano>/preview.cgi?channel=1
```

Links for other channel streams (i.e. RTSP or MPEG-TS) can be found by logging into the Admin panel and selecting **Status** in the Channel menu.

Important considerations

- The default auto channel has the related HDMI (or SDI) port selected by default. As soon as you connect your video source to the port, it appears automatically in the auto channel's custom layout. Changing the auto channel's frame rate or deleting the auto channel will change the frame rate used at the output port for that video input. Deleting the auto channel forces the video output port to use the original frame rate of the video input source.

- If you delete the auto channel, it will re-appear upon factory reset or when loading the default configuration preset.
- **Pearl Nano** - If you modify the automatic channel's video input source manually using the custom layout editor, the channel no longer functions as an automatic channel and the channel name changes to the name of the video source. To revert a channel back to an automatic channel, add **Auto** as the sole video source for the channel using the custom layout editor and delete the current channel name. When you press **Enter** using your keyboard to save the blank channel name, the channel reverts to the default automatic channel. Alternatively, you could perform a factory reset or apply the default configuration preset to restore the automatic channel; however, other important system settings and configurations will also revert to their default settings.

Which signal does the auto channel use?

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

If you attach more than one video source to the video inputs while the Pearl device is powered on, the first source you attach has the highest priority. If you attach more than one source before powering on the Pearl device, the following priority is used:

Priority	Pearl device	Connector Type
1	All	HDMI (with HDMI Audio)
2 - Pearl Mini and Pearl Nano	All	SDI (with SDI Audio)

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

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

You can see which video and audio sources are configured for the channel from the Info page, see [View system information using the Admin panel](#).

Channel configuration

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



Channel encoding settings may be automatically overwritten when using a Pearl device with a Content Management System, see [About Panopto recording and webcasting](#).

Topics include:

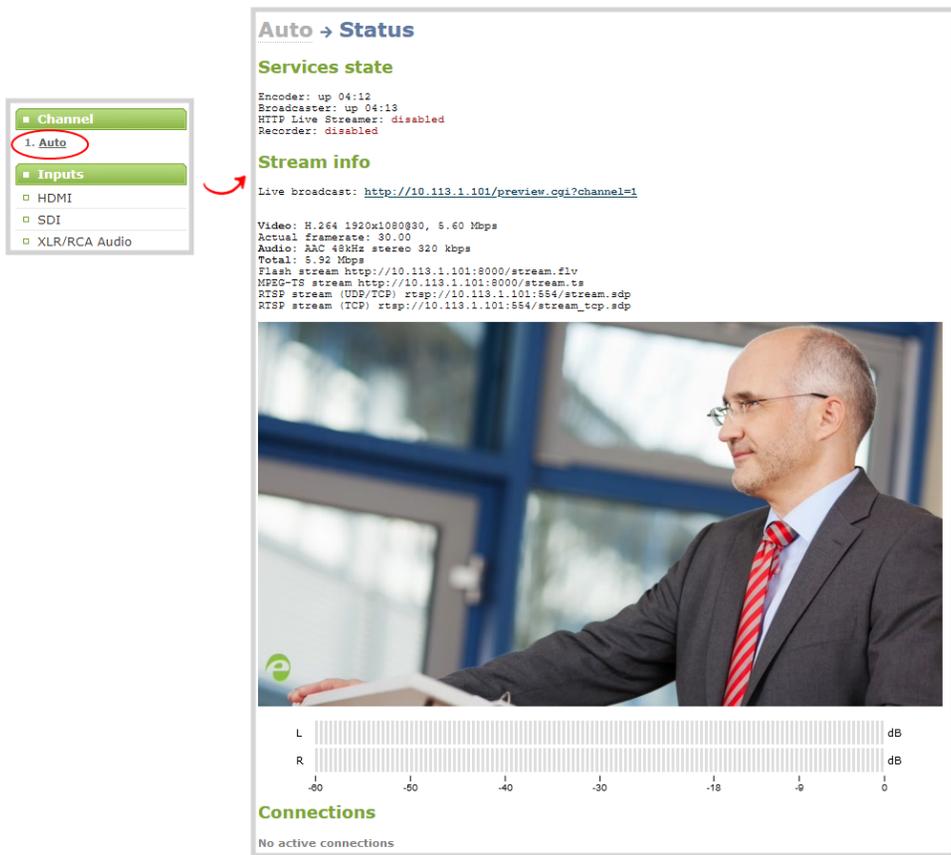
- [Pearl Nano - Configure an auto channel](#)
- [Add video sources](#)
- [Add an audio source to a layout](#)
- [Rename a channel](#)
- [Preview a channel](#)
- [Add or remove channel metadata](#)
- [Configure encoding](#)
- [Codecs and file format compatibility](#)
- [Configure video encoding](#)
- [Configure audio encoding](#)

Configure an auto channel

Pearl-2 and Pearl Nano include Auto channels 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.

Configure an automatic channel using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
3. From the Channel menu, click **Auto**. The channel's status page opens



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



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

Add video sources

Pearl Nano

You can add up to two video sources to the custom layout for your channel using the custom layout editor.



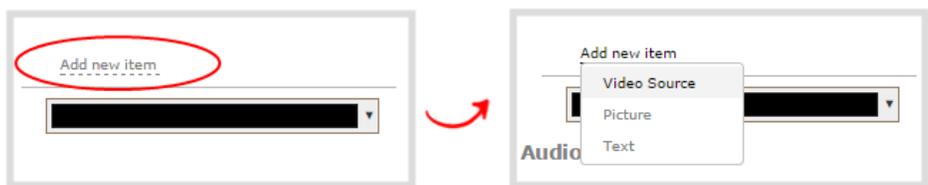
If more than one video source is added to a channel, we recommend configuring the channel encoding to use a fixed resolution as the frame size instead of automatically using

 the resolution of the video source as the frame size (default). A fixed channel resolution ensures that your channel displays properly at a fixed resolution.

For more information, see **Configure encoding**.

Add a video source using the Admin panel

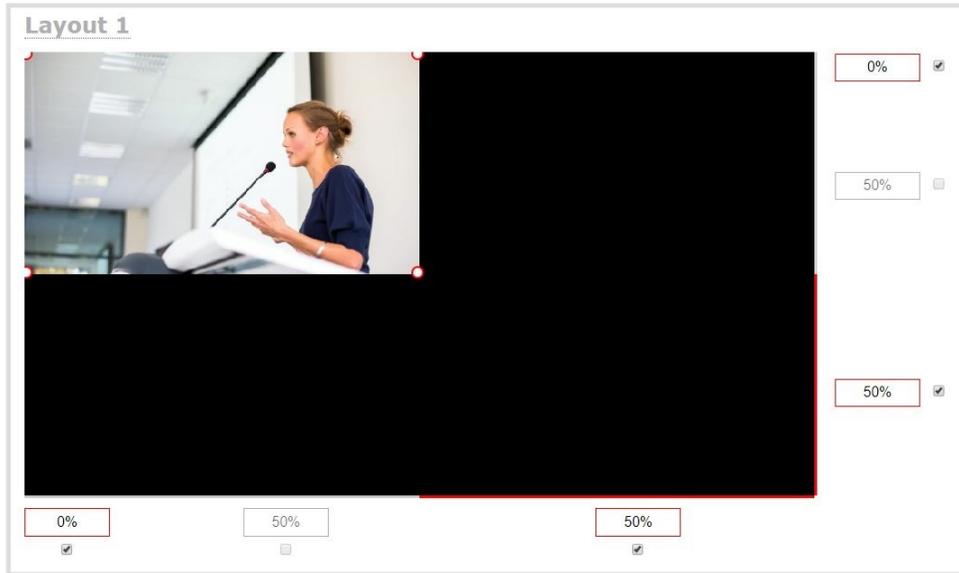
1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channel(s) menu, select the channel and click **Layouts**. The custom layout editor opens.
3. Below the Layout editing area, click **Add new item** and select **Video Source**. The Source settings appear.



4. Under **Source settings**, select either a video input or a channel in the **Source** drop-down menu.
5. Under **Source settings**, select a video input in the **Source** drop-down menu.

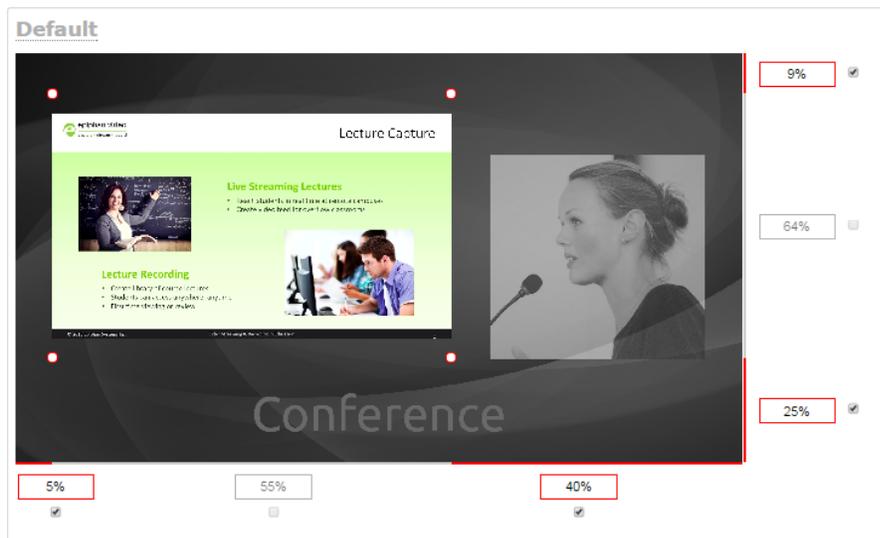
 For best results, check **Keep aspect ratio when scaling** in the **Source settings**.

The selected video source appears in the layout editing area.



When adding an RTSP network source, a preview image may not display in the layout area until you Save the layout. The preview can also appear to have no signal if the RTSP source is not currently sending content.

- Click and drag the red and white handles on the corners of the source to re-size it in the layout editor area. Alternatively, enter a value in the fields along the side and bottom of the layout editing area to resize the selected item.





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

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



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

8. Click **Save**.

To layer multiple video sources on Pearl Nano for picture in picture or add other items like logos and images, you can click and drag the video sources that appear in the item list beneath **Add new item** and change their order. Items that are higher up the list appear over top items that are lower down the list.

A note about item positioning and sizing

There are multiple ways to position and size images, text overlays, and video sources in the layout area

- Using the mouse.
- Using the keyboard.
- Using the manual positioning values with percents.
- Using the manual positioning values with pixels.

Using the mouse

Click and drag to move the item. Click and drag the round, red and white handles to resize an image or video source (for text overlays, just use the padding settings). Using this method you can make quick changes that are in increments of approximately 5% of the width or height of your layout area. For more refined movements, press the Ctrl key on your keyboard while dragging the item with the mouse.

Using the keyboard

Use the arrow keys on the keyboard to move the item up, down, left or right in the layout. Changes are in increments of approximately 5% of the height or width of the layout area. Press the Ctrl key while using the arrow keys to make more refined movements. To change the size of an image or video source, press the Shift key while using the arrow keys (for text overlays, just use the padding settings). Press both Ctrl and Shift for fine-grained size control.

Using percents

Specify a whole number, followed by a percent sign (e.g. 4%) in any of the manual positioning fields. See [Resize and position items using percents or pixels](#) for more information.

Using pixels

If you need to specify an exact amount in pixels (rather than percent) you can type a pixel value in any of the positioning value squares followed by the characters px (e.g. 56px). You can mix and match pixels and percents changing only the boxes you want to use pixel values. At any time you can switch back to percents by typing a percent. See [Resize and position items using percents or pixels](#) for more information.

Add an audio source to a layout

You can add multiple audio sources to the layouts for a channel using the Admin panel. By default, audio is enabled for the channel on the channel's encoding page.

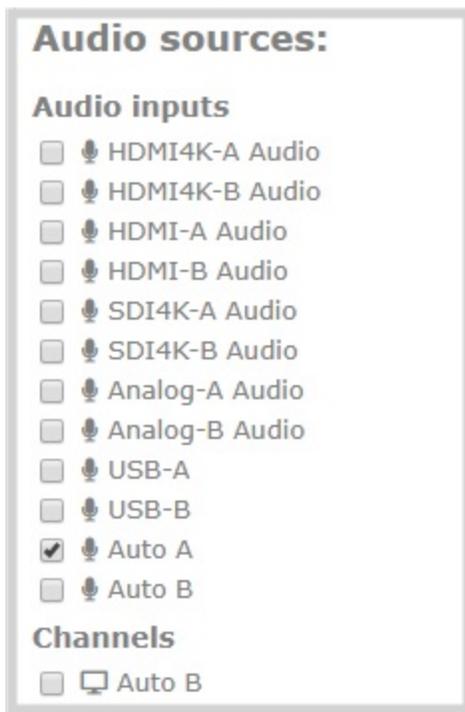
Important considerations

- For SRT and RTSP input sources, there's no need to manually add the audio sources separately to your channel. When the network stream is connected to your Pearl device as an input source, a corresponding audio source is automatically added to the list of audio sources for your channels, even if there is no audio in the stream.
- The XLR-B audio inputs and the RCA audio inputs are linked within Pearl-2. The XLR L/R audio inputs and the RCA L/R audio inputs are linked within Pearl Nano. If you use both at the same time, their audio is mixed. If the two audio sources share the same audio signals, the common audio signals are amplified. To avoid this, you can disable one or the other audio port, see [Assign audio sources to an input](#).
- If a channel is selected as the video source for a layout, the corresponding audio for that channel is added automatically.
- You can add multiple audio sources to the same layout. However, if the two audio sources share all or some of the same audio signals, then the common audio signals are amplified.
- Selecting multiple loud audio sources in the same layout may cause audio clipping on that layout. Before going live, always check the volume levels for the layout and adjust the volumes at audio sources to avoid clipping, see [Adjust audio gain and delay](#).
- If audio encoding is not configured for a channel, no audio signal is processed or sent with the video content when recording, streaming, or confidence monitoring, see [Configure audio encoding](#).

- If an audio source is added to a layout and then the audio device is disconnected from the input port on the Pearl device, some residual noise may be detected in the layout. Remove the audio source from the layout.

Add an audio source to a layout using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Layouts**. The custom layout editor opens.
3. In the Layouts list that appears at the top of the page, click a layout's row to select that layout.
4. Check the audio source that you want to use for the layout and click **Save**.



What's Next

You can check the audio encoding settings for your channel and ensure that audio is enabled, see [Configure encoding](#).

To adjust the gain for an audio input source, see [Adjust audio gain and delay](#).

Rename a channel

You can change a channel's name from any of the channel configuration pages or using the custom layout editor.

Auto channels on Pearl-2 and Pearl Nano

Auto channels initially have the channel name Auto . If you manually change the video input source on the layout to something other than the automatic video source, the name of the channel changes to the name of the video input source. To revert the channel name back to the auto channel's default name, delete the channel name and leave the name field blank. When you save, the Pearl device will automatically repopulate the name field with the default name.

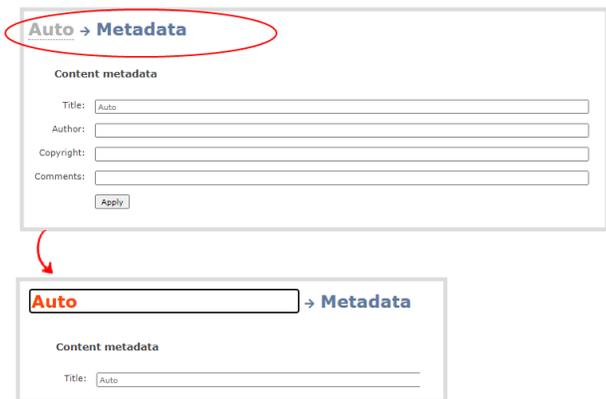
International characters

You can include certain international characters in channel names. For a complete list, see [International character support](#).

Do not include any special currency, mathematical symbols, and other special characters such as slashes or spaces in the channel name. Pearl Nano replaces special characters with an underscore.

Rename a channel using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channel(s) menu, select the channel and choose any of menu options for the channel. For example, select **Metadata**.
3. Click on the channel name that appears at the top of the page. The text turns red.



4. Enter the new name using alphanumeric characters. We recommend using underscores to separate words rather than using spaces.
5. Press **Enter** using your keyboard to save the new name.

Preview a channel

You can open a live preview of a channel in your web browser to see any configuration changes you make to the channel as you make them. Web browsers that support HTML5 and Flash are supported.

There are several ways to preview a channel:

- Preview a channel from the Info page
- Preview a channel from the Status page

Important considerations

- Some web browsers disable auto playback of videos with audio. In those cases, the audio for the channel being previewed is muted by default.
- HTML5 does not support PCM audio encoding. If PCM audio encoding is configured for a channel, audio does not play in the preview link for the channel.
- PCM audio encoding at 48 kHz is not supported. A live broadcast preview link is not provided for a channel that is configured for PCM audio encoding with a sampling bitrate of 48 kHz.
- If HTTPS is configured for Pearl Nano, the live broadcast URL will start with *https* instead of *http*.

Preview a channel from the Info page using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Info**. The information window opens. Then click **View** to open a preview window of the channel.

Preview a channel from the Status page using the Admin panel

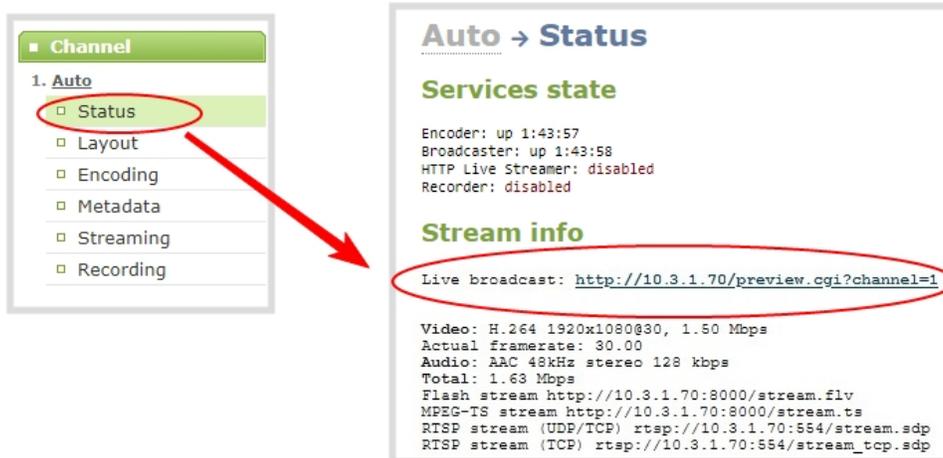
You can use the Admin panel to open a preview link for a channel from the Status page. The Live broadcast preview can be viewed using web browsers that support HTML5 or Flash. You can also see a preview of the channel directly from the Status page itself.

The Status page lists information about the channel, including stream information such as the bitrate, frame size, streaming and preview links, as well as the state of the services on Pearl Nano.



This feature is not available using the local console on the Pearl device.

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channel(s) menu, select the channel and click **Status**. The Status page opens and a live preview snapshot appears below the Stream info.
3. Right-click the **Live Broadcast** link and select **Open in a new Tab** or **Open in a new Window**.



Add or remove channel metadata

When you configure metadata for a channel, that metadata is embedded in all channel recordings and streams. You can specify the following metadata that the media player displays for your viewers:

- title of the presentation
- Author
- copyright date or other labels such as proprietary information, preliminary etc.
- additional comments about the broadcast, such as time of the broadcast, or change to the schedule

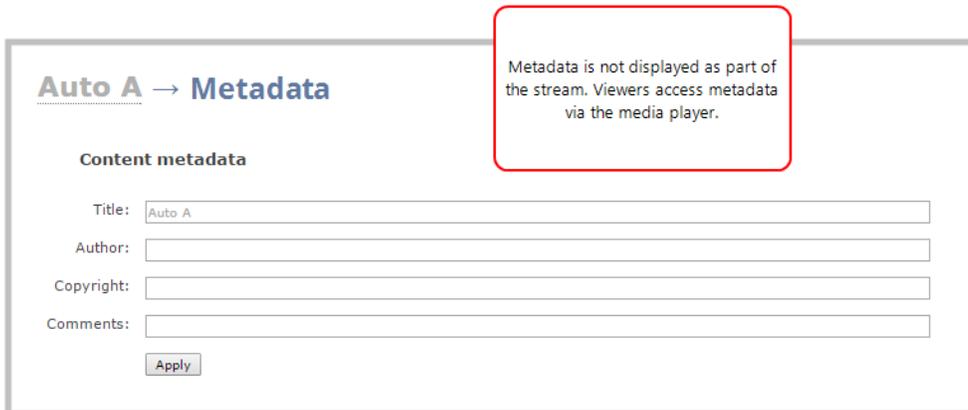
How metadata is displayed depends largely on the media player. For example VLC, stores the metadata in a media information file, while other media players scroll the text horizontally from right to left across the bottom of the media player window.



Use only alphanumeric and diacritic characters in metadata descriptions. The whole metadata string is refused if any special currency or mathematical symbol appears in the description. You must remove the offending characters before Pearl Nano will accept the description.

Add or remove channel meta data using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channel(s) menu, select the channel and click **Metadata**. The Metadata configuration page opens.
3. Type information into the fields or modify existing content as needed, then click **Apply**.



Auto A → Metadata

Content metadata

Title:

Author:

Copyright:

Comments:

Metadata is not displayed as part of the stream. Viewers access metadata via the media player.

Configure encoding

You can modify the encoding settings for a channel. The encoding settings let you fine tune your channel recording or live stream. You can select a specific frame size, bitrate, audio or video codec, and more.



Channel encoding settings may be automatically overwritten when using the Pearl device with a Content Management System, see [About Panopto recording and webcasting](#).

Topics include:

- [Codecs and file format compatibility](#)
- [Configure video encoding](#)
- [Configure audio encoding](#)

Codecs and file format compatibility

Pearl Nano supports the following codecs:

Table 36 Supported video codecs

Value	Description
H.264	H.264 provides high quality video while using low bandwidth.
H.265 (Pearl Nano only)	H.265 provides the highest quality video while using a comparatively low bandwidth. Compare the quality and required bandwidth relative to H.264.

Table 37 Supported audio codecs and bitrate guidance

Value	Description
AAC	<p>AAC is comparable to MP3 and may even provide better sound quality at a similar sample bitrate. Supported sampling bitrate values are: 16, 22, 44 and 48K kHz.</p> <p>Setting the channel bitrate to match the audio source's bitrate provides the best sound quality and avoids audio resampling. Most digital signals (HDMI or SDI sources) use 48 kHz. Most digital signals (HDMI or SDI sources) use 48 kHz audio. For analog signals, 44 kHz provides a good quality audio sample.</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. Supported sampling bitrate values are: 22 kHz, 44 kHz and 48 kHz.</p> <p>Setting the channel bitrate to match the audio source's bitrate provides the best sound quality and avoids audio resampling. Most digital signals (HDMI or SDI sources) use 48 kHz. For analog signals, 44 kHz provides a good quality audio sample.</p> <div data-bbox="363 999 1445 1171" style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">  <p>Web browsers that use Flash (FLV) do not support 48 kHz MP3 audio. When selecting this encoding, you must use a web browser that supports HTML5 or a media player to preview your channel.</p> </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>Setting the level to match the audio source's level provides the best sound quality and avoids audio resampling. Most digital signals (HDMI or SDI sources) use 48 kHz audio. For analog signals, 44 kHz provides a good quality audio sample.</p>

Format compatibility

Not all streaming and recording protocols support all combinations of video and audio codecs. The following table lists any video/audio codec compatibility considerations for the supported streaming formats on Pearl Nano.

Table 38 Video/audio codecs and formats for streaming

Video Codec selected	Audio Codec selected	RTSP	FLV	MPEG-TS	MJPEG
H.264	No audio codec	✓	✓	✓	
	PCM	✓	✓		
	MP3	✓	✓	✓	
	AAC	✓	✓	✓	
H.265 (Pearl Nano only)	No audio codec	✓		✓	
	PCM	✓			
	MP3	✓		✓	
	AAC	✓		✓	

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

Table 39 Video/audio codecs and formats for recording

Video Codec selected	Audio Codec selected	MP4 and MP4-Fragmented	AVI	MOV	MPEG-TS
H.264 (and H.265 for Pearl Nano)	No audio codec	✓	✓	✓	✓
H.264 (and H.265 for Pearl Nano)	PCM	✓	✓	✓	
H.264 (and H.265 for Pearl Nano)	MP3	✓	✓	✓	✓
H.264 (and H.265 for Pearl Nano)	AAC	✓	✓	✓	✓

Configure video encoding

You can configure the video encoding settings for a channel using the Admin panel. Video encoding settings include:

- **Video codec:** The video codec determines the type of compression and decompression, and also affects the video quality.
 - Pearl Nano supports H.264 and H.265 encoding.

- **Video encoding profile:** This can be set to High, Main, or Baseline. Main is only available on Pearl Nano if H.265 codec is selected.
- **Frame size:** The resolution applied to the channel when you stream, record, or output video to a confidence monitor. This can be set to automatically match the input video's resolution or set to a fixed resolution.
- **Key frame interval:** How often a key frame that contains all the pixels is sent when streaming. The longer the key frame interval, the smaller the video file size (and vice versa).
- **Limit frame rate:** You can limit the frame rate for the channel.
- **Bitrate:** Increase or decrease image quality by increasing or decreasing the channel's **Bitrate** value. Video with a high level of motion and high resolution, such as sporting events, requires a higher bitrate.
- **Adaptive frame size:** Automatically adjust the size of large key frames if they exceed a set limit. This helps avoid issues caused by sudden spikes in data such as stream interruptions and in some cases complete stream disconnect. For most use cases, this should be set to off.



By default, Pearl Nano automatically uses the incoming video source frame size as the frame size for streaming and recording when the channel has only one layout with a single video source. If your channel has multiple video sources or layouts, you must manually set a frame size for the channel. If you plan to switch layouts during a live stream, a fixed frame rate is recommended. This avoids the stream from stopping and restarting due to frame size changes when switching between single-source layouts that use different frame sizes.

Important considerations

- For optimum system performance, the frame size of the channel should be set to match the frame size of your video input source to avoid scaling, see [Optimum System Load](#).
- If your channel has a custom layout with only one source and your source and stream aspect ratios differ, then your source appears centered in the frame and matte bars are added automatically to the top and bottom (or left and right sides) of the frame to make up the difference. See [Remove black bars \(matte\) from the video](#).
- If an SDI or HDMI video input source that is selected to display at the HDMI output port also appears in a custom layout for a channel, then the channel's encoding settings are used at the HDMI output. Changing the channel's frame rate will change the frame rate used at the output port for that video input. If the video source appears in multiple layouts in different channels, the one with the highest frame rate set in the encoding settings is used.

- The larger the channel's frame size, the more bandwidth is needed for streaming and the recorded files are bigger. Instead of using the same frame size as the original video source, you can configure a smaller frame size for the channel and let Pearl Nano downscale the video. For example, if the input video signal resolution is 1920×1080 (a 16:9 aspect ratio) and the channel's frame size is set to 1280×720, Pearl Nano downscales the video and streams/records the channel at the lower frame size, using less bandwidth and producing smaller recorded files.
- If you have unchecked all the manual resizing and positioning boxes in the custom layout editor and you downscale the video source using the frame size setting on the **Encoding** tab (for example, select 1280×720 frame size for a full HD video source), then the source appears cropped within the frame instead of scaling to fit the frame.

You can add black bars around your video source by adjusting the frame size. For example, if your video source has a 16:9 widescreen/HD format but you need a 4:3 frame size on your output, Pearl Nano automatically adds black bars to the top and bottom of the frame if you choose a frame size for the channel that has a 4:3 aspect ratio.

There is some trade off between video quality and bandwidth size, depending on the encoding settings you choose. The following table lists some additional considerations when choosing video encoding settings.

Table 40 Video encoding settings

Setting	Description
H.264	H.264 provides high quality video while using low bandwidth.
H.265 (Pearl Nano only)	H.265 provides a high quality video while using a lower bandwidth. Compare the quality and required bandwidth relative to H.264.
Key frame interval	<ul style="list-style-type: none"> • The key frame interval feature specifies how often a key frame (a frame that contains all the pixels) is sent when streaming the video. This setting also impacts how quickly a video moves through the frames when a viewer uses the search function of their media player. • Increasing the number of seconds between key frames can significantly reduce your bandwidth and system resource usage with minor impact to your video quality. A good rule of thumb is to keep the interval between 2 to 3 seconds and decrease the key frame interval as the motion increases. • Try different settings and note changes in the video quality. If your video quality is poor and jittery you may need to decrease the interval between key frames. If you have unlimited bandwidth and system resources you can choose an option to stream key frames only.

Setting	Description
Frame rate	<p>Frame rate reflects the number of images that are encoded per second. Reducing the frame rate for a channel reduces bandwidth usage, and vice versa.</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. <p>When adjusting the frame rate, you may need to try different values to achieve the best outcome.</p>
Bitrate	<p>In general, higher bitrates mean higher image quality, but more bandwidth is needed for streaming and video recordings are larger. You can set the bitrate to improve the image quality .</p> <p>For example, an HD Blu-ray video is typically in the range of 20 Mbps, whereas a standard-definition DVD is usually 6 Mbps.</p> <p>If you're unsure what bitrate value to use, start at 5000 kbps (slightly less than a typical DVD) and test to see how this looks for your viewers.</p>
Adaptive frame size	<p>Automatically adjust the size of large keyframes if they exceed a set limit. This helps avoids issues caused by sudden spikes in data such as stream interruptions and in some cases complete stream disconnect.</p>

Configure video encoding for a channel using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Encoding**. The encoding configuration page opens.
3. Select a video **Codec** and do one of the following:
 - If **H.264** (or H.265 on Pearl Nano) is selected, select a **Video encoding preset** and a **Video encoding profile**.

Item	Options
Video encoding	Software: This matches the default from previous generations of Epiphan

Item	Options
preset	products. Only select this if you need software encoding or X.264 encoding to match results created with previous generations of Epiphan products or firmware
Video encoding profile	<p>Baseline: Choose this option when streaming to an application that requires robustness and cannot tolerate data loss, for example video-conferencing.</p> <p>Main: Choose this option for standard-definition broadcasts.</p> <p>High: This is the default. Choose this option when video is viewed for broadcast and disk storage applications, particularly for high definition television application such as Blu-ray disk storage format and HDTV broadcast service.</p>

4. Configure the frame size, do the following:
 - a. Uncheck **Use current signal resolution as the frame size**.



 Enabling **Use current signal resolution as the frame size** is not recommended if the video input resolution changes frequently. An unstable cable or other disturbance that causes the resolution of the video input signal to change during a live stream can cause the stream to drop. Unchecking this feature helps prevent that.

- b. Select a **Frame size** from the list of options or enter a custom frame size in pixels.
5. 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. Change the **Bitrate**. 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. **Optionally**, change the **Adaptive frame size** to auto if during streaming, the connection experiences random stream disconnects and it is determined that the disconnect is caused by very large key frames. **The default should be adequate in most applications.**
8. Click **Apply**.

Configure audio encoding

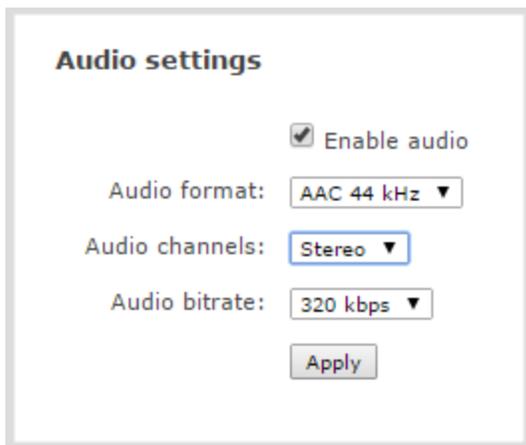
If your channel includes audio sources in any of the layouts, then **AAC 48 kHz** is set as the default audio codec for the channel. You can choose a different audio codec for a channel using the Admin panel. The following table lists the supported audio codecs and bitrates.

Table 41 Supported Audio codecs and bitrates

Value	Description
AAC	<p>The AAC (default) audio codec is comparable to MP3 and may produce better sound quality with a similar bitrate. Supported values are 16, 22, 44 and 48K kHz.</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> <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. Supported values are 22 kHz, 44 kHz and 48 kHz.</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 style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">  Flash (FLV) doesn't support 48 kHz MP3 audio. When selecting this value you'll need to use a media player to preview your channel. </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.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">  Flash (FLV) doesn't support 48 kHz PCM audio. When selecting this value you'll need to use a media player to preview your channel. </div>

Change the audio codec for a channel using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channel(s) menu, select the channel and click **Encoding**. The encoding configuration page opens.



3. In the Audio settings, ensure that **Enable audio** is checked to include audio in the channel.
4. From the **Audio format** drop down, select an audio codec.
5. From the **Audio channels** drop down, choose mono or stereo (default).



Choose **Mono** to have left and right stereo channels combined so that when you listen to the streamed or recorded audio, the same blended sound comes through both the left and right channels.

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

Pearl Nano - XLR/RCA1

6. From the **Audio bitrate** drop down, choose a bitrate. For guidance, see [audio bitrates](#). For stereo audio, we recommend 256 kbps or 320 kbps.
7. Click **Apply**.

Custom layout configuration

Using the custom layout editor, you can create completely different looks for your channel - like picture in picture or side-by-side video sources. You can add media like transparent images and custom backgrounds to a layout, then resize and arrange all the different media elements the way you want.

Topics include:

- [About the custom layout editor](#)
- [Resize and position items using percents or pixels](#)
- [Open the custom layout editor for a channel](#)
- [Configure a custom layout for a channel](#)
- [Set the background color](#)
- [Add an image to a layout](#)
- [Upload or remove an image using the Media page](#)
- [Add a text overlay](#)
- [Custom system variables for text overlays](#)
- [Crop a video source](#)

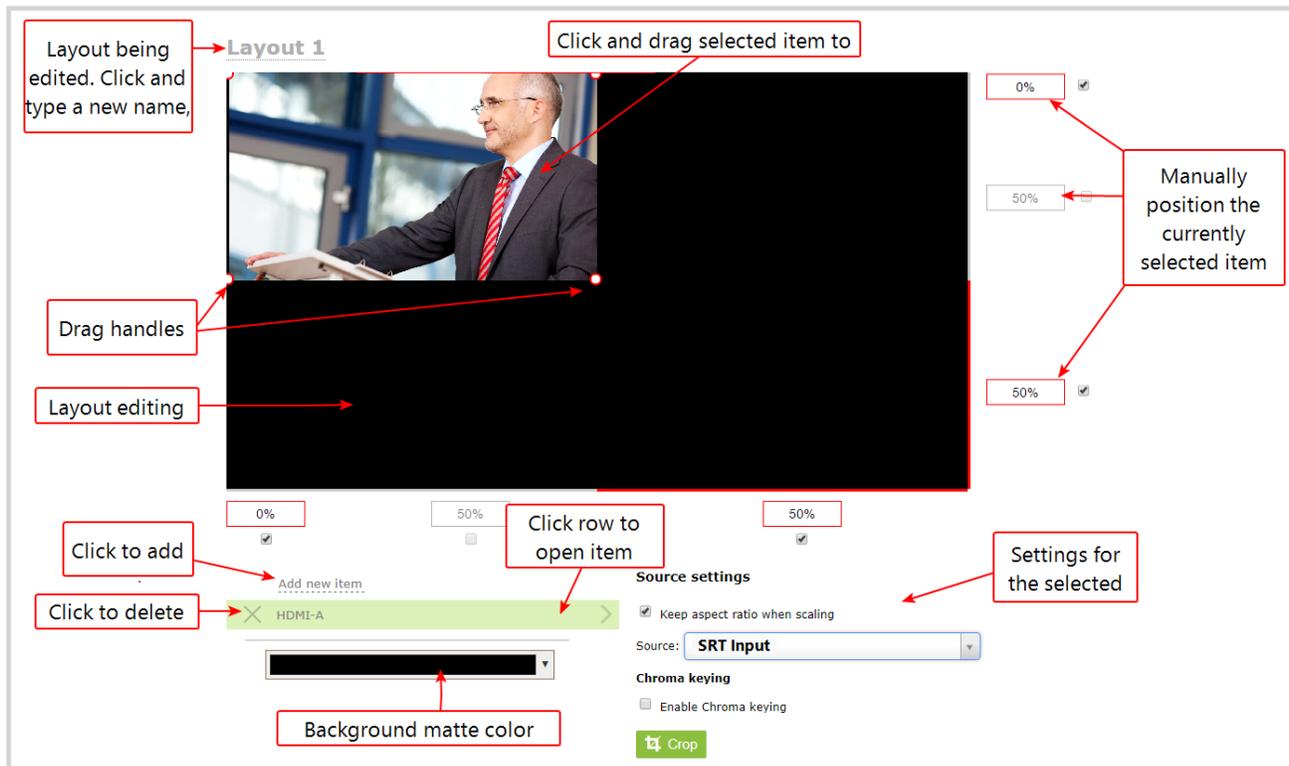
About the custom layout editor

The custom layout editor gives you full control of the size and position of images, video sources, and text overlays.

Access the custom layout editor using the Admin panel when you select your channel from the Channels menu and click **Layouts**.

Layout editing

The layout editing area is where you can add images, video sources, and text overlays to your layout. You can also choose a background matte color, crop images and video, and edit video sources. **Note-** the Pearl Nano cannot edit video sources.



The main layout area has the same frame size and aspect ratio as the encoding setting of the channel. As you add items to the layout, they appear in the layout editing area. The currently selected item is presented in full color. Unselected items appear transparent.

To change the settings for an item, click an item in the item list that appears below the layout editing area. The settings for that item appears.

Move and size items in the layout editing area

You can use the mouse to click and drag items into position, or you can type values into the fields along the side and bottom of the layout area and manually position the selected item. You can also enter values as a percentage of the full layout area (for example, enter **4%**) or in pixels (for example, enter **16px**).

You can **resize** an image, text overlay, or video source by clicking and dragging the red and white handles at the corners of an item or by entering values into the fields along the side and bottom of the layout area. To maintain the aspect ratio when resizing an item, make sure you've checked the **Keep aspect ratio when scaling** box for that item.

A note about item positioning and sizing

There are multiple ways to position and size images, text overlays, and video sources in the layout area

- Using the mouse.
- Using the keyboard.
- Using the manual positioning values with percents.
- Using the manual positioning values with pixels.

Using the mouse

Click and drag to move the item. Click and drag the round, red and white handles to resize an image or video source (for text overlays, just use the padding settings). Using this method you can make quick changes that are in increments of approximately 5% of the width or height of your layout area. For more refined movements, press the Ctrl key on your keyboard while dragging the item with the mouse.

Using the keyboard

Use the arrow keys on the keyboard to move the item up, down, left or right in the layout. Changes are in increments of approximately 5% of the height or width of the layout area. Press the Ctrl key while using the arrow keys to make more refined movements. To change the size of an image or video source, press the Shift key while using the arrow keys (for text overlays, just use the padding settings). Press both Ctrl and Shift for fine-grained size control.

Using percents

Specify a whole number, followed by a percent sign (e.g. 4%) in any of the manual positioning fields. See [Resize and position items using percents or pixels](#) for more information.

Using pixels

If you need to specify an exact amount in pixels (rather than percent) you can type a pixel value in any of the positioning value squares followed by the characters px (e.g. 56px). You can mix and match pixels and percents changing only the boxes you want to use pixel values. At any time you can switch back to percents by typing a percent. See [Resize and position items using percents or pixels](#) for more information.

Audio source selection and saving edits

Select audio source(s) for your channel by adding them to your layouts. The bottom section of the custom layout editor is where you select the audio source for the currently selected layout. It's also where you'll find the **Save** button.

- **Pearl-2 and Pearl Nano** - If an Auto channel is selected as a video source, then Auto A audio is selected by default.

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

When setting the audio gain for your channel, add all your audio sources to your layout first, then set level of gain for your audio sources appropriately. When you're done all your changes, click **Save**.

Resize and position items using percents or pixels

You can resize layout items using the percent/pixel adjustment boxes in a layout using the custom layout editor. You can also reposition video sources. See [Resize layout items](#) and [Position layout items](#).

There are three adjustment boxes along your layout's horizontal axis and another 3 boxes along the vertical axis. You can enter **percent or pixel values** into checked adjustment boxes (bordered with red) to position and resize your item(s).

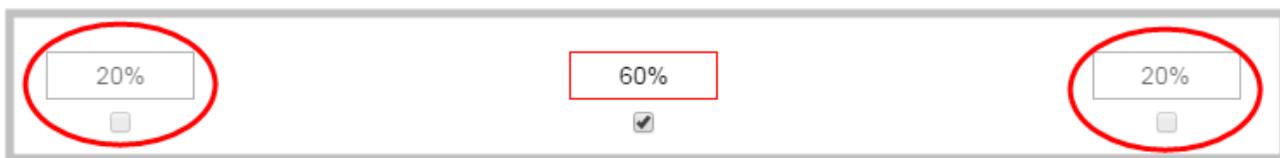


Percent values are used in adjustment boxes by default, and can be converted to pixels by simply overwriting the percent value in a given adjustment box and replacing it with a pixel value.



When entering **percent values**, ensure the suffix "%" is added to your value (i.e. "20%"). When entering **pixel values**, ensure the suffix "px" is added to your value (i.e. "200px"). A layout item's total pixel dimensions are a reflection of your channel's frame size, as configured in your encoding settings (see [Configure encoding](#)).

Unchecked boxes are grayed-out in color and are not directly editable but dynamically change their values to reflect a 100% total of either the horizontal or vertical axis, depending on values entered in adjacent adjustment boxes. See the [Adjustment boxes for item resizing and positioning](#) table below for more information.



The values contained in checked boxes (bordered with red) are **anchored** and do not dynamically adjust their values.

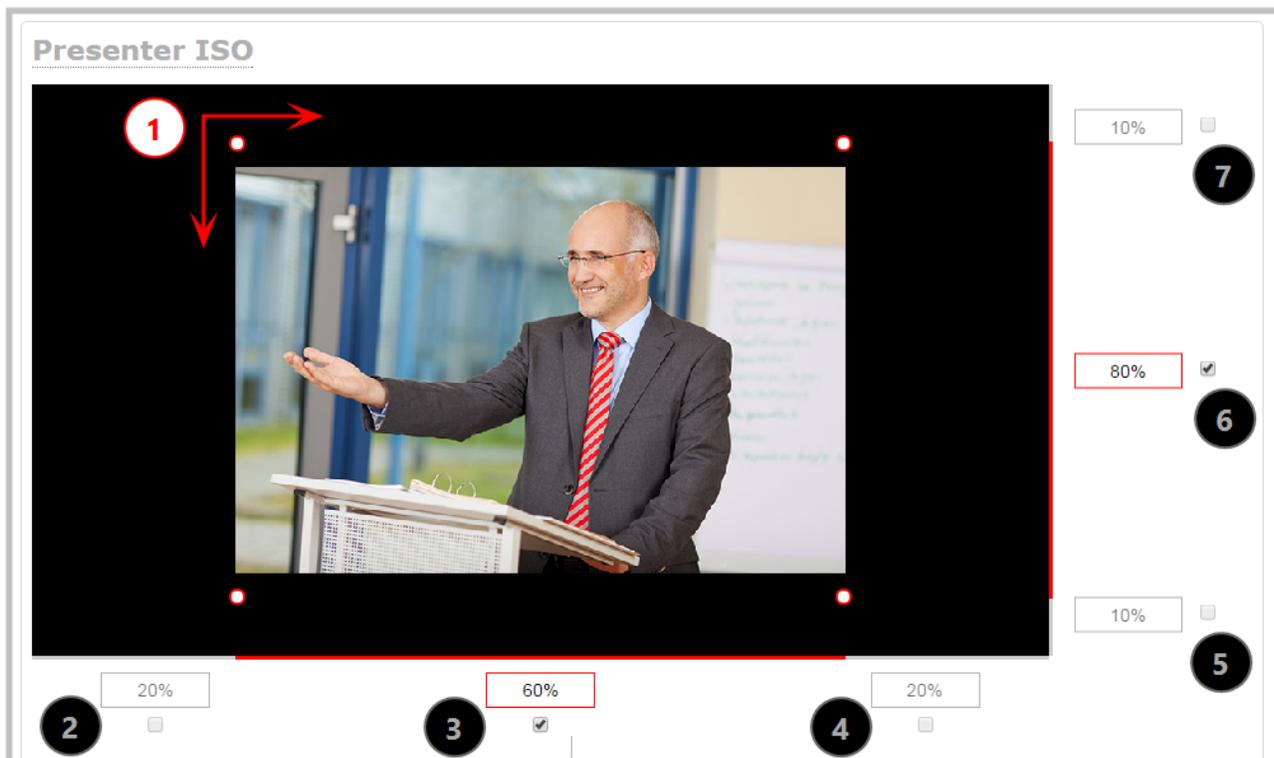


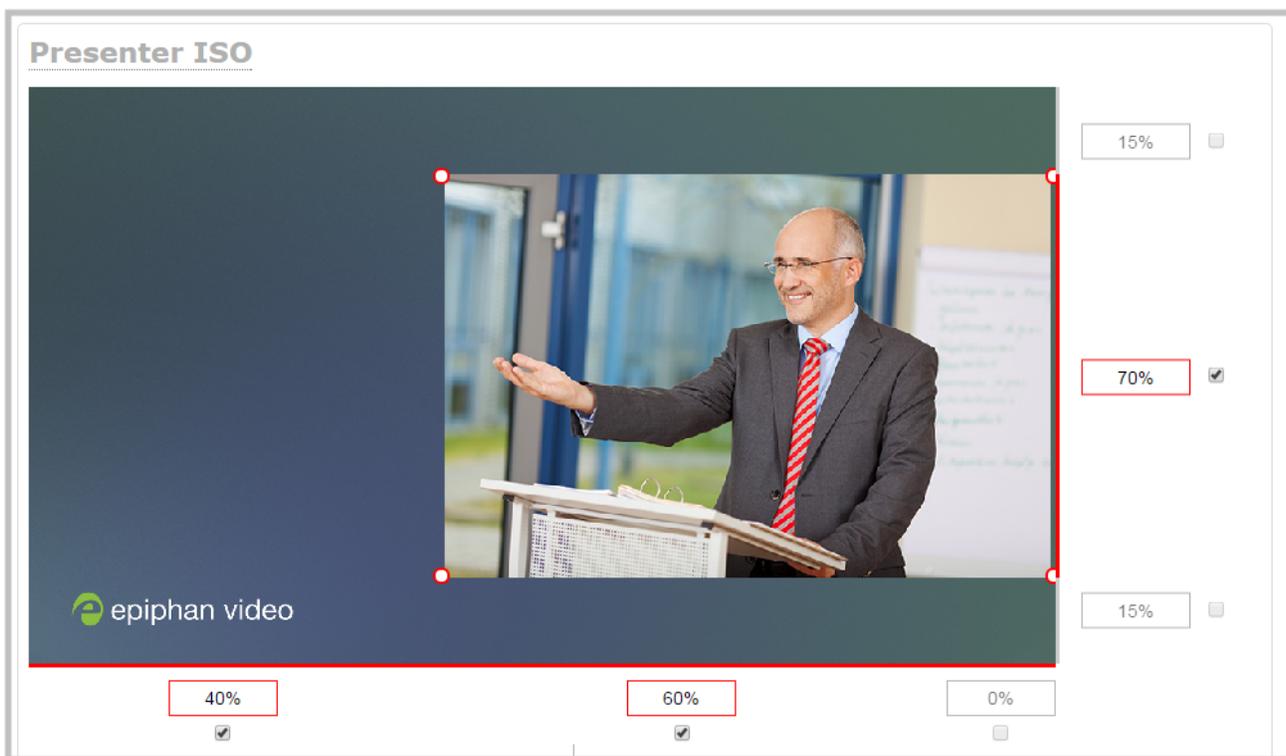
Table 42 Adjustment boxes for item resizing and positioning

Item	Description
1	The area of your layout item. The four red/white dots represent the boundaries of your layout item. There may be some black space between your item and its boundaries if Keep aspect ratio when scaling is enabled (see Add an image to a layout).
2	The percentage of blank space (or number of pixels) from left to right on the layout's horizontal axis. (for example, the item is displaced 20%, or 200px, to the right).
3	If using percents, this value is the item's percentage of total width on the layout's horizontal axis . (for example, the item takes up 60% of the layout's width – represented by a thin red bar above the percent box). If using pixels, this value is the item's width, in pixels , with a maximum pixel width (for example, frame size) identified in your channel's encoding settings Configure encoding .
4	The percentage of blank space (or number of pixels) from right to left on the layout's horizontal axis. (for example, the item is displaced 20%, or 200px, to the left).
5	The percentage of blank space (or number of pixels) from the bottom upward on the layout's horizontal axis. (for example, the item is displaced 10%, or 100px, from the bottom up).

Item	Description
6	If using percents, this is the items percentage of total height on the layout's vertical axis . (for example, the item takes up 80% of the layout's height – represented by a thin red bar to the left of the percent box). If using pixels, this value is the item's height, in pixels , with a maximum pixel width (for example, frame size) identified in your channel's encoding settings Configure encoding .
7	The percentage of blank space (or number of pixels) from the top downward on the layout's vertical axis. (for example, the item is displaced 10%, or 200px, from the top down).

Resize layout items

The easiest way to resize a layout item is to use the **center adjustment boxes** (annotated as #3 and #6 in the image above) on each of the horizontal and vertical axes to set your item's width and height respectively. You can also use your mouse cursor to select the corners and manipulate them into the size you want. Hold the shift key while doing so to keep the frame size constant. If you need to **crop** your image, see [Crop a video source](#).



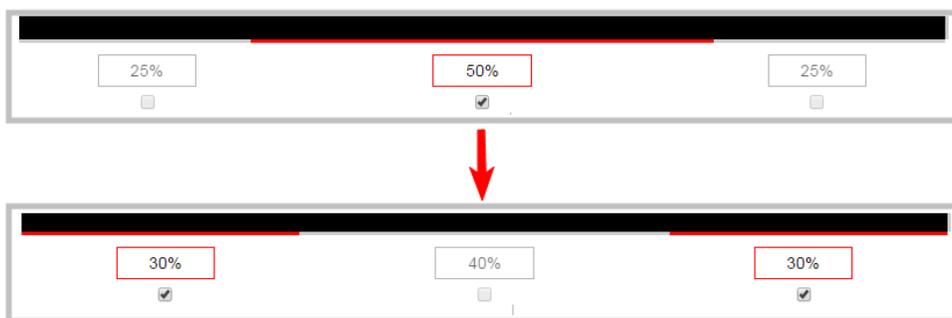
In the example, the video source is resized to 60% of the layout's width and 70% of the layout's height (with aspect ratio maintained). (Alternatively, pixels could be used to resize the layout item in a similar fashion.)

An important consideration when resizing layout items

Your item will resize automatically if both left and right (or top and bottom) adjustment boxes contain values (percents or pixels) that exceed the total of 100% (if using percents), or maximum pixel count (if using pixels) for the corresponding horizontal (or vertical) axis.

For example, if you originally set the width of an item to 50% of the layout area (or 960 pixels, assuming your item has a maximum width of 1920 pixels in this example) with no values entered in the left and right adjustment boxes (i.e. the left and right boxes are deselected), the item automatically centers itself in the layout area with the left and right percents at 25% each (remember – percents are used by default in the layout editor, even if pixels are used in adjacent boxes). Combined with the 50% (960px) width of the image, these two 25% (480px) values total 100% (1920px) of the layout's horizontal axis.

If you instead decide to enable the left and right percent boxes and change their values to 30% each (instead of the current 25%), then the image's width shrinks from 50% (960px) to 40% (750px) to accommodate the change and maintain a total layout width of 100% (1920px).



Setting the left and right (or top and bottom) percent values so the axis total among the three percent boxes exceeds 100% will always result in the center percent box value automatically reducing itself to maintain the 100% total, shrinking your selected layout item in the process.



To resize a video source so that it appears smaller within the frame, like for a picture in picture layout, you can change the scale from the video input's configuration page. You can also crop a video source smaller. For examples, see [Channel layout examples](#). After a video source is resized smaller than the frame size of the channel, you can simply click and drag the video source into position or use any of the other methods described.

Position layout items

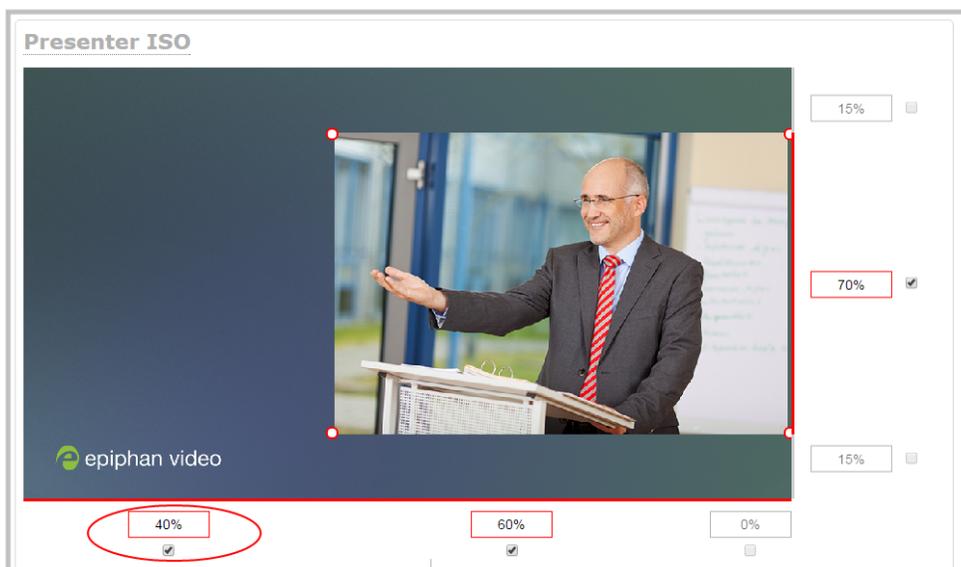
There are multiple ways to reposition items in the frame using the layout editor:

- You can reposition images and video sources by entering values into the left/right and top/bottom adjustment boxes (identified as #2/4 and #5/7 respectively in the [Adjustment boxes for item resizing and positioning](#) table). The values entered into these boxes represent a portion of the total percentage (or pixels) of the layout's width or height.
- Alternatively, you can position your layout items using the keyboard by selecting the item with your mouse cursor, and pressing the arrow keys to move the selected item by 5% in any direction.
- You can also position your item with additional keyboard precision by **holding Ctrl and pressing the arrow keys** to nudge your item by a very small fraction in the direction of your choice.

Example 1: horizontal positioning using percents

To position your item along the horizontal axis, first resize your items if desired (as described in [Resize layout items](#)), then enter a percent or pixel value into either the left or the right adjustment box to shift your layout item.

For example, using **percents** to move a layout item with a 60% width as far to the right of the layout area as possible, you would need to enter 40% into the left percent box to push the item to the right. The layout item originally takes up 60% of the layout width, so this added 40% shift pushes the item as far to the right as possible (i.e. 100% of the horizontal axis).

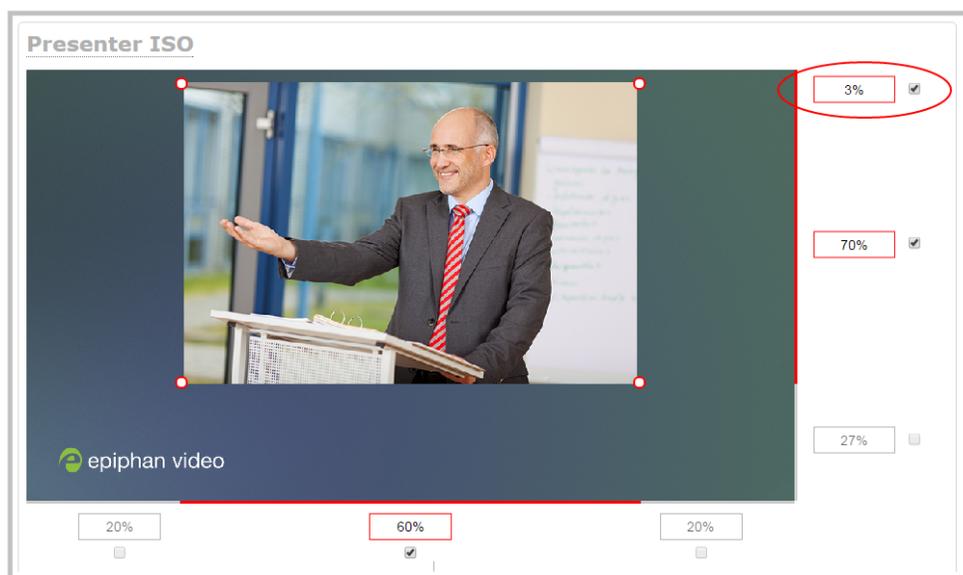


The right adjustment box automatically sets itself to 0% to reflect that there is no more room remaining to maneuver the image along the horizontal axis any further. Alternatively, you could reposition the image in the exact same way by instead setting the right percent box to 0%.

Example 2: vertical positioning using pixels

To position your layout item along the vertical axis, enter a percent or pixel value into either the top or the bottom adjustment box to shift your layout item downward or upward, respectively.

For example, using **pixels** to move a layout item that is set to 756px in height to the top of the layout while leaving a small margin of background (say 25px), you could either enter "25px" into the top percent box (to specify the small margin from the top down) or enter 27% into the bottom percent box (to specify a 27% margin from the bottom up – added to the item's 70% height this leaves a 3% margin above your layout item.)



You can manipulate elements to get the custom look that you want using percents, pixels, your keyboard, or any combination. Here's an example of using pixels and percents to create a custom layout with two video sources and a background image. The slideshow video source is scaled and the presenter's video source is cropped in this example.



Open the custom layout editor for a channel

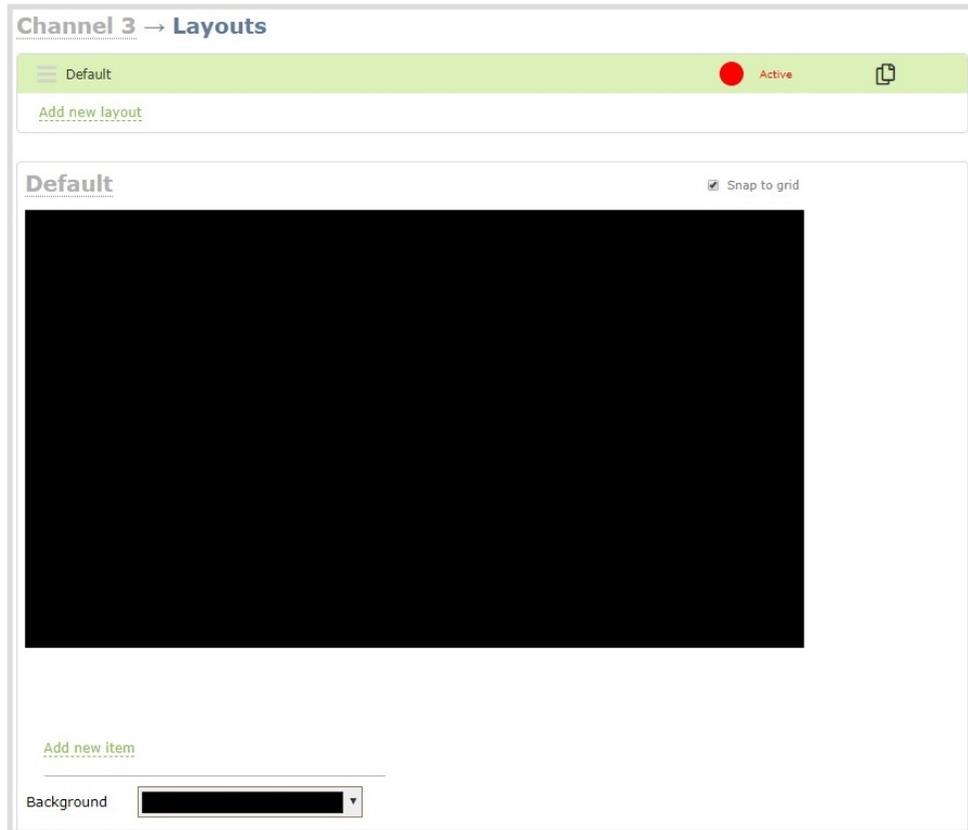
1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Layout(s)**. The custom layout editor opens.
3. From the **Layouts** list, select the layout you want to edit. The layout editor updates to display the selected layout and the row for the selected layout is highlighted in green.

If this is a new layout, an unformatted layout, or there is no video source connected, then the layout area is empty and a black background matte appears.

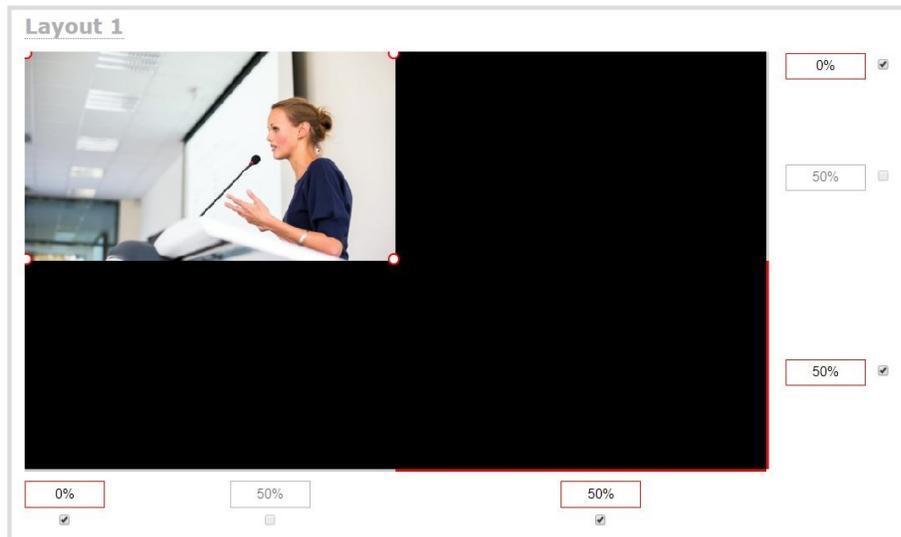
Configure a custom layout for a channel

Configure a custom layout for a channel using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channels menu, select the channel and click **Layouts**. The custom layout editor opens.
3.
 - **Pearl Nano** - If this is an Auto channel and you have a video source connected to Pearl Nano and the channel encoding is set to use the current signal resolution as frame size, the video source automatically appears in the full frame. Otherwise, a No Signal image appears.



4. Click and drag the red and white handles on the corners of the video source to re-size it in the layout editor area.



5. Click **Save** when you're done or continue to add additional video sources to the layout, resize and crop each video source to exactly how you want them to appear. For examples, see [Channel layout examples](#).

Rename a layout

You can rename a layout using the custom layout editor.

You can include certain international characters in layout names. For example, common character sets for Western and Central European languages, Nordic languages, and Russian are supported. For a complete list, see [International character support](#).

Rename a layout using the Admin panel's custom layout editor

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Layout(s)**. The custom layout editor opens.
3. Select a layout from the layout list at the top of the page.
4. Click the name of the layout so that the name turns red. Type a new name and then press the **Enter** key.

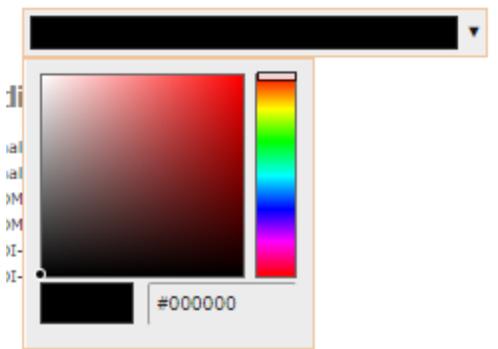


Set the background color

You can select the background color to fill any unused space in a layout using the custom layout editor. For example you can add a color from your corporate color scheme.

Set a background color matte for a layout using the Admin panel's custom layout editor

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Layout(s)**. The custom layout editor opens.
3. Click the drop down arrow next to the existing (by default black) background color field. The color picker opens.



4. Pick a new color or type in an RGB value in the field; the color is updated in the layout area.
5. Click anywhere off the color picker to close the picker.
6. Click **Save**.

Add an image to a layout

You can add images to a layout using the custom layout editor. Use images to create a background for your source, to add your corporate logo, or to add relevant information about the event you're streaming.

Pearl Nano supports .PNG and .JPEG images up to a maximum size of 4096x2160. For many applications like a background, you will want your image to have the same aspect ratio as the channel in which the image appears. Pearl Nano supports images of all different shapes, such as 16x16 pixels; however, we recommended that you upload exactly the size you need and avoid scaling the image using the custom layout editor.

Images can be uploaded in advance from the Media page, see [Upload or remove an image using the Media page](#). Otherwise, you can drag and drop to upload an image using the custom layout editor. Note that no warning is displayed if the image is too large or if an image exists with the same name using drag and drop. The file will be replaced with the new image you upload.

Any image without the proper file extension appears in the layout editor but doesn't display in the actual video output. For instance, a .PNG image with the file extension .bmp or an invalid file extension such as .png2 are examples of improper file extensions.



If your uploaded image does not appear in the list, ensure it doesn't exceed the maximum image size of 4096x2160. No warning or error message is displayed if your image is too large.

Add an image to a layout using the Admin panel's custom layout editor

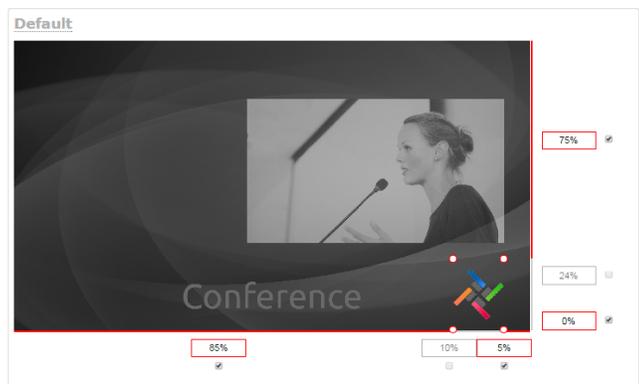
1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Layout(s)**. The custom layout editor opens.
3. Click **Add new item** and choose **Picture** from the drop down. The picture settings appears.



4. Select an image from the **Use picture** drop-down menu. To upload the image, drag and drop it from your desktop to the gray **Please select picture** area. For best results, keep the **Keep aspect ratio when scaling** check box selected (default).

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

5. Your picture appears in the **Picture settings** preview and is added to the layout area.
6. In the layout area, use the mouse, the keyboard or the manual position value fields to position and resize your image. For background images, click and drag to fill the full layout area. For more details, see [About the custom layout editor](#).



7. Re-order the items in your layout by clicking and dragging items in the item list.

 To layer items over top of each other, like for background images or a transparent logo, you can click and drag elements that appear in the item list beneath **Add new item** and

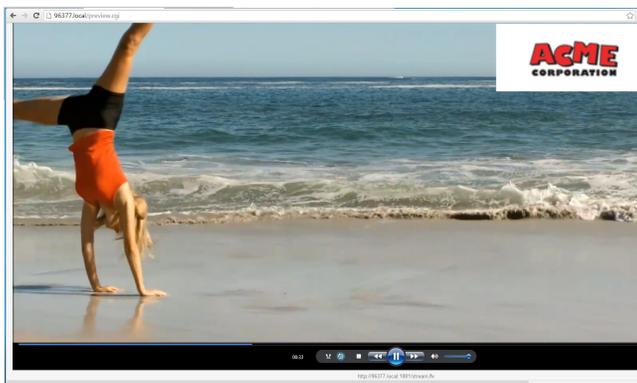
 change their order. Items that are higher up the list appear over top items that are lower down the list.

8. Click **Save**.

Upload or remove an image using the Media page

You can customize a channel by adding pictures as backgrounds, overlays, or transparent overlays. Video files are not supported on Pearl Nano. Image file formats supported include: PNG and JPEG for pictures.

The maximum supported picture image size is 4096x2160. No warning or error message is displayed if your image is too large. Files that exceed the maximum size won't appear in the drop-down list.



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

There are two ways to upload images. You can upload images from the Media page using the Admin panel or drag and drop your image onto the **Add new item** area using the custom layout editor, see [Add an image to a layout](#).

Important considerations

- Media file names should not include special characters, slashes, or spaces. The underscore character "_" is allowed.
- Uploading an image of the same name overwrites the existing image.

- Any image without the proper file extension appears in the layout editor but doesn't display in the actual video output. For instance, a .PNG image with the file extension .bmp or an invalid file extension such as .png2 are examples of improper file extensions.

Upload or remove an image using the Admin panel's Media page

- Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
- From the Configuration menu, click **Media**. The Media page opens.
- To upload a file, click **Choose File** and browse to select the file to upload, then click **Upload**.
- To remove a file, click **Remove** beside the file name and click **OK** when prompted.



If you delete an image that is used as part of the layout for any channel, select a different image or no image by using the drop-down list in the **Picture settings** box within that channel's layout before deleting the file using the steps below.

Add a text overlay

Text overlays are useful to add information like a title, location, or the date and time in to layouts in your channel. You can add text to any layout using the custom layout editor. The following tables lists shortcut codes that you can enter and the resulting content that appears on screen.

Table 43 Overlay text shortcut codes

Item	Shortcut code	Example
date format: yyyy-mm-dd	%F	2019-01-26
date format: mm/dd/yy	%D	01/26/19
year	%G	2019
month (01)	%m	01
month (Jan)	%b	Jan
month (January)	%B	January
day of the month	%d	26
weekday (Thu)	%a	Thu

Item	Shortcut code	Example
weekday (Thursday)	%A	Thursday
time (24-hour clock)	%T	20:40:45
time (12-hour clock)	%r	02:40:45 PM
hour (24-hour clock)	%k	20
hour (12-hour clock)	%I	08
minute	%M	40
second	%S	45
millisecond	%#m	378
channel name	%c	Camera Feed 1
AM/PM	%p	AM
am/pm	%P	am
time zone	%Z	EST

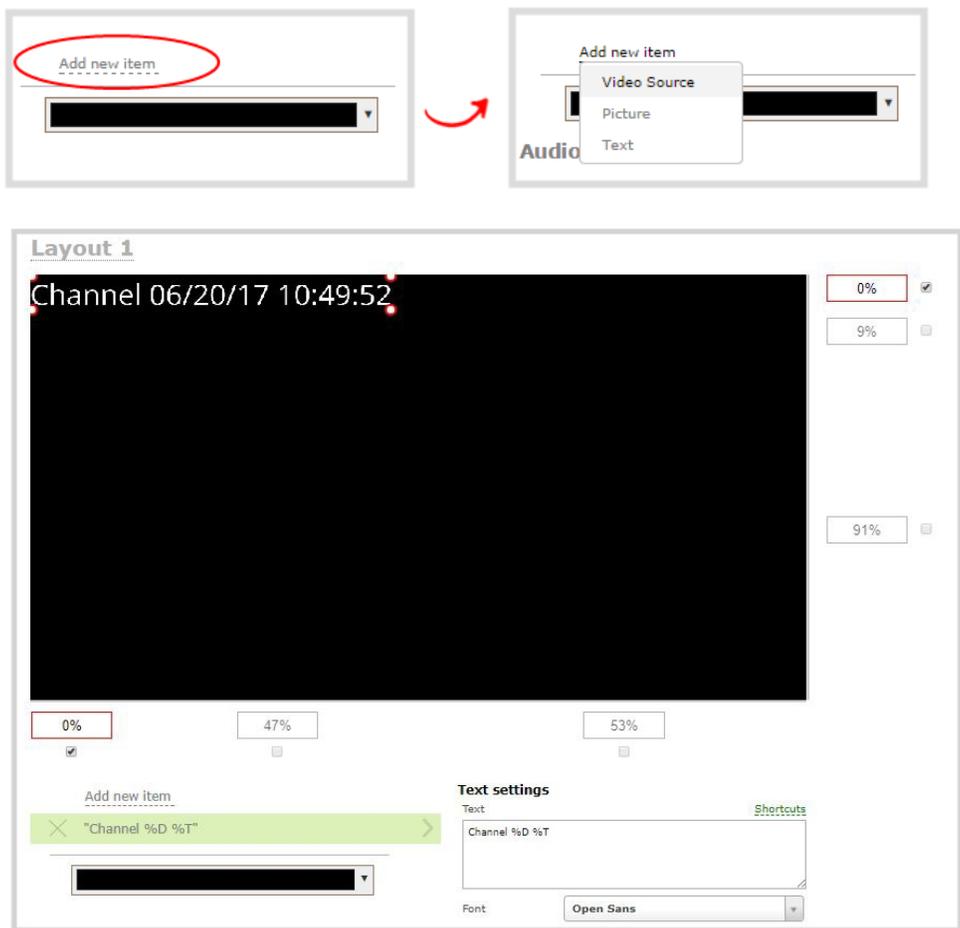


If you use a non-monospaced font, the size of the text overlay changes as the letters, numbers, and the length of words change. Use a monospaced font to maintain a consistent size for the text overlay (assuming the total number of characters in the text string doesn't change).

You can include certain international characters in text overlays. For a complete list, see [International character support](#).

Add a text overlay using the custom layout editor

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Layout(s)**. The custom layout editor opens.
3. Click **Add new item** and select **Text**. The new item is added to the layout editing area and to the top of the list of items. The Text settings also appear.



 You can change the order in which items appear on the layout editing area by rearranging the order the items appear in the list beneath **Add new item**. Items at the top of the list appear in front, and items lower down the list appear behind.

4. In the **Text** field, type what you want to appear in the text overlay. Include [Overlay text shortcut codes](#) as needed. Press **Tab** or click outside the text field to refresh the preview in the custom layout editor.

For example, if you enter:

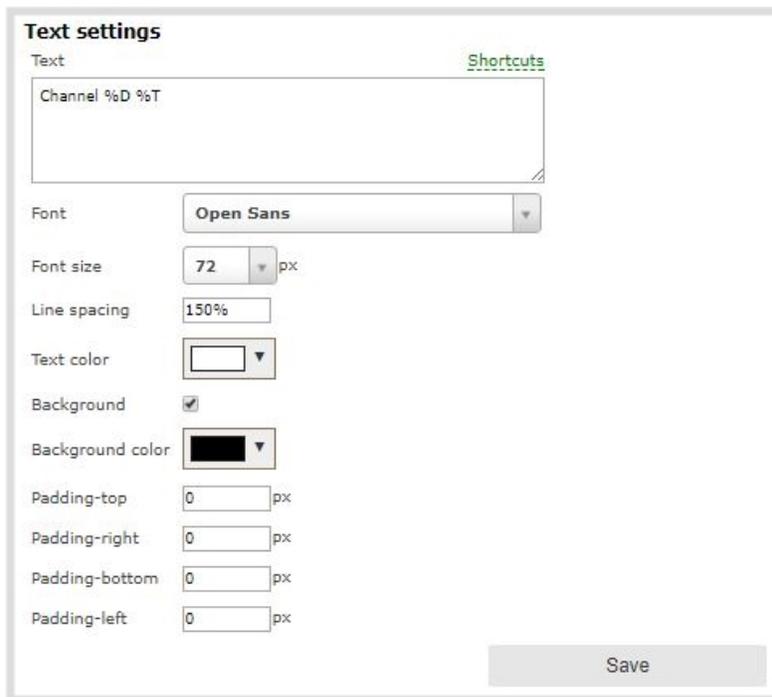
```
%A %B %d, %G. Live streaming channel Input A.
```

The resulting text is displayed:

Friday June 23, 2017. Live streaming channel Input A

5. Select the **Font**, **Font size**, and **Text color**. You can also change the default **Line spacing** in percentages. For a mono-spaced font, use Droid Sans Mono.

 **Limitations:** The maximum supported text size is 500 px. Padding values must not exceed the frame size. Do not enter negative padding values.



6. Resize the overlay text box using the padding settings.

 The handles on the corner of the overlay text box are not click-and-drag and do not resize the text box. To resize the text box, use the padding fields to add space above, below, and on either side of the text.

7. In the layout editing area, click and drag to move the overlay text box or enter values in the manual position value fields along the side and bottom of the layout area.
8. Click **Save**.

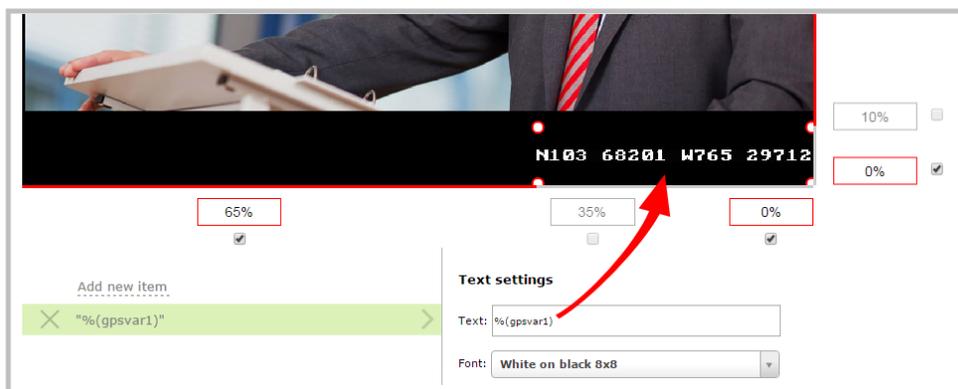
Custom system variables for text overlays

Using legacy HTTP APIs, you can create your own custom system variables for use in text overlays. Pearl Nano supports legacy RS-232 APIs. This is useful to add custom overlay text that changes throughout the course of your live stream or recorded program.

For example, using the legacy HTTP API you can create a system variable for the current GPS co-ordinates, then use a script to update the GPS co-ordinates in your custom variable as the physical location in your stream changes.

Here's an example custom variable called **gpsvar1** that has a value of `N103 68201 W765 29712`. To insert the custom system variable into a text overlay, simply type **%(gpsvar1)** into the **Text** field.

 If you use a non-monospaced font, the size of the text overlay changes as the letters, numbers, and the length of words change. Use a monospaced font to maintain a consistent size for the text overlay (assuming the total number of characters in the text string doesn't change).



The RS-232 SET command syntax in this case is `VAR.SET.<name>=<value>`, for example:

```
VAR.SET.gpsvar1=N103 68201 W765 29712
```

where *<name>* is **gpsvar1** and *<value>* is `N103 68201 W765 29712`.

There are no limits for the frequency of system variable commands using RS-232. However, only one command can be issued at a time.

HTTP system variable commands are issued at a frequency of **5 per second**. You can include up to six variables in a single HTTP SET command. After issuing a SET command, all channels using the specified variables are updated.

 System variables are considered volatile. They are deleted when a Pearl system reboots.

To learn more about global variable command syntax and important considerations when using them, see: [Pearl System Legacy RS-232/HTTP API Guide](#) .

For more information about sizing and positioning elements in the custom layout editor area, see: [About the custom layout editor](#).

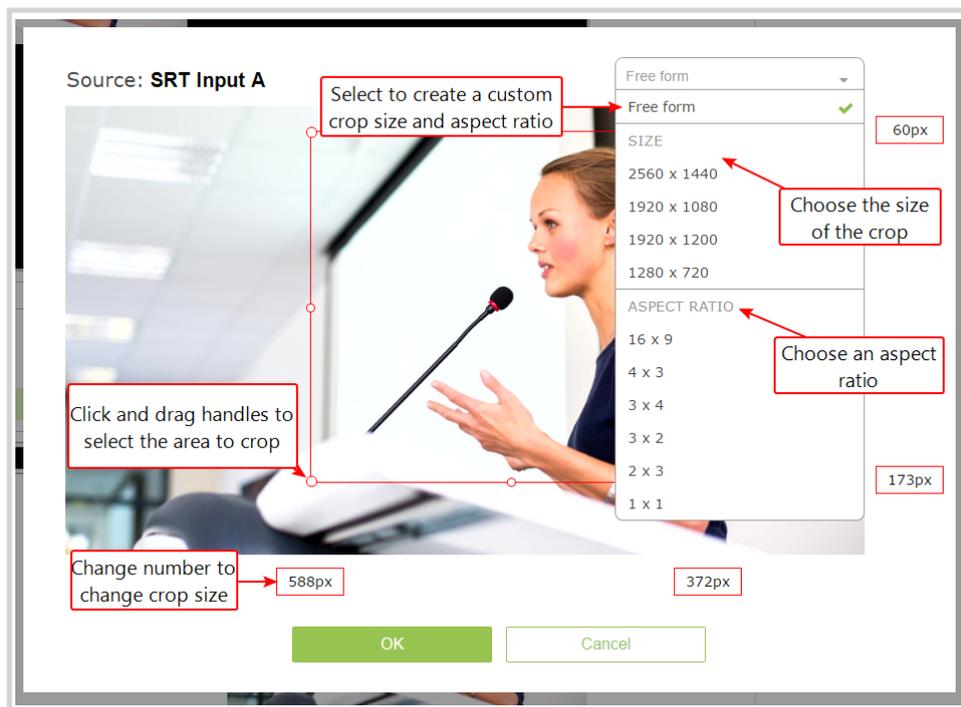
Crop a video source

You can crop a video source to change the size and shape of your video as it appears on screen using the custom layout editor. Cropping a source gives you a lot of advantages and can help to conserve the overall amount of processing CPU usage for Pearl Nano.

Pearl-2 and Pearl Nano can capture a 1080p section from a 4K source, a specific aspect ratio or size from a source, or select a crop that fits into your layout better than the full area of your video.

Crop a source using the Admin panel's custom layout editor

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Layout(s)**. The custom layout editor opens.
3. Select a video source from the items list. The **Source settings** appears.
4. Click **Crop**. Your video source appears in a pop-up editing window.



5. The **Crop** window has several tools for creating the best crop possible.
 - **Free form** is the default crop mode. In this mode, you can change the size, aspect ratio, and position of the crop with minimal restrictions.
 - The red box with click-and-drag circular handles in the corners shows the cropped area that appears in the final layout. Only the content inside the box shows in the layout. In **Free form** mode, you can click and drag the red handles to change the size and ratio of the box, and you can click and drag the box itself to change its position. When you have selected an aspect ratio, you can alter the size by dragging the red handles. When you have selected a size, you can change its position by dragging the box.
 - The number boxes allow you to make precise crops. Click the text boxes and enter a number to determine how many pixels of distance from the edge that line is drawn. You can also erase the "px" after the number and type in "%" to manipulate the box using percentages. For more details on how these boxes work, see [Resize and position items using percents or pixels](#).
 - To create a crop with a specific resolution, choose a **Size** from the available list. This creates a box with that exact resolution. Click and drag the box to move it into position. The size cannot be changed except by selecting a different size, or by selecting **Free form** or **Aspect Ratio**.
 - Selecting an aspect ratio allows you to create a crop box of almost any size in a particular ratio. After selecting a ratio, you can manipulate the crop area's size and position without changing its shape.
6. Click **OK** to close the crop window.
7. Click **Save**.



You can also manipulate the crop-box using keyboard controls. You can move the crop box using the arrow keys, and holding **Ctrl** or **Shift** while resizing the box keeps the aspect ratio of the box constant. Hold **Shift** and use the arrow keys to move one side of the box while leaving the other in the same location.



If creating a crop on a video source that has no active signal the crop is based on the default resolution of the 'No Signal' image, which is 1280x720p. To work around this set a custom 'No Signal' image at the same resolution as the video source you intend to bring in and crop.

Video and audio input sources

The Admin panel automatically discovers all video and audio sources that you connect to the input ports on the Pearl device and lists them in the Inputs menu of the Admin panel. You can also configure a video source's settings using the Admin panel.

Networked video sources like SRT need to be manually added before they display in the Inputs menu. A corresponding audio source is always added to your custom layout editor when you add a networked video source, even if the video stream contains no audio, see [Add an audio source to a layout](#).

An input source's content can be video, a picture, or music from a connected audio mixer. Content can originate from a camera, computer screen, an imported image in the Pearl device, and even another Pearl device.

Topics include:

- [About connecting video and audio sources](#)
- [Tested RTSP-based IP cameras](#)
- [Connect an RTSP source](#)
- [Connect an SRT stream as an input](#)
- [Preview a video source using the Admin Panel](#)
- [Rename an input port](#)
- [Configure a video input source](#)
- [Add a custom No Signal image](#)

For instructions to configure an audio input and adjust audio gain or delay, see [Audio input ports](#).

About connecting video and audio sources

You can connect and disconnect video and audio sources while the Pearl device is powered on and when it is powered off. However, for network video sources connecting via the Ethernet port, the source device sending the stream and the Pearl device must both be powered on to make the connection.

Connect your video and audio sources to the following input ports on your device:

Table 44 Cable and port connections

Source type	Input port
SDI	SDI port
HDMI (HDCP-protected) or DVI (adapter)	HDMI port
USB audio (UAC)	USB 3.0 port (rear)
Ethernet	RJ-45 port. SRT and RTSP are digital sources you connect to your Pearl device via the Ethernet network port.
Audio	Pearl-2 and Pearl Nano - XLR or RCA

You can also connect RTSP sources such as IP cameras and even another Pearl device over the network using the Admin panel.



Application of amplified speaker signals to the audio line inputs exceeds the recommended ratings and may permanently damage the device.

The Admin panel automatically discovers all video and audio sources that you connect to the input ports on Pearl device and lists them in the Inputs menu of the Admin panel. Sources coming from the Ethernet network such as SRT and RTSP need to be added manually to appear in the Inputs menu. When a network source is added as an input, a corresponding audio source is automatically added to the list of audio sources for your channels, even if there is no audio. See [Add an audio source to a layout](#).

When a video source is connected, the system automatically detects and adjusts the image capture settings every 60 seconds. The interval is configurable. Generally no further configuration is needed; however you can fine tune some settings using the Admin panel.

If no video source is connected to an input port or no stream is being transmitted from a source over the Ethernet connection, "No Signal" displays wherever that input is used. You can change that to display the default "No Signal" image for Pearl Nano or create your own custom no signal image. See [Add a custom No Signal image](#) .

Changing the video or audio source while streaming or recording can cause the recording to stop or the stream frame size to change, depending on how your channel is configured. If the frame size changes, viewers may get disconnected and need to re-connect to the live stream.

Audio mixers and other line-level audio devices can be connected to:

- **Pearl-2 and Pearl Nano** - the XLR and RCA audio input ports .

Embedded audio from sources connected to the HDMI, SDI, and USB ports (only USB audio on Pearl Nano) is also supported.

For guidance on connecting an audio source, see [Selecting an audio source](#) .

Tested RTSP-based IP cameras

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

The URL syntax refers to the additional piece of text that needs to be included in the source URL to connect your IP camera to a Pearl device, see [Connect an RTSP source](#) to learn how to connect an RTSP source like an IP camera using the Admin panel.

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

`"rtsp://192.168.0.160/video1"`

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

`"rtsp://192.168.0.160/"`

Table 45 List of tested IP cameras

Brand	Model	Image	URL syntax	Audio?	Default username and password
Q-See	QCN8029Z		/	No	admin admin
Sony	SRG300SE		/video1	Yes	admin admin

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

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

Connect an RTSP source

You can connect an RTSP source (such as an IP camera or another Pearl device) to Pearl Nano over a network using the Admin panel.

For a list of tested cameras and their URL syntax, see [Tested RTSP-based IP cameras](#) .

RTSP video encoding is supported with H.264 video codec (and H.265 on Pearl Nano) and MP3 or AAC audio formats. We recommend using the hardware acceleration option for improved performance (enabled by default).

Important considerations

- If an RTSP source is connected but unused in any channel, only key frames are encoded to preserve CPU resources.
- **Pearl Nano** - It is recommended to only use a single RTSP source for a Pearl Nano

- To synchronize timestamps between your RTSP source and Pearl Nano, the same time synchronization server should be used for both. We recommend that you configure an NTP server on your Pearl device and use it as a time synchronization server for your RTSP source. see [Configure a time server](#).



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

Connect an RTSP source using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Inputs menu, click **Add input**, and then click **Add RTSP input** The RTSP input page opens.
3. Enter the **Input URL**, **Username** and **Password** for your RTSP source and select either **UDP** or **TCP** as the Preferred transport. If you're using another Pearl device as an RTSP source, see [Share a live broadcast stream \(HTTP, HTTPS, or RTSP\)](#) .
4. (Optional) Rename the RTSP source, see [Rename an input port](#) .
5. (Optional) Configure a custom "No signal" image, see [Add a custom No Signal image](#) .
6. Click **Apply** to save your settings and connect your RTSP source.

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

Status

CONNECTED

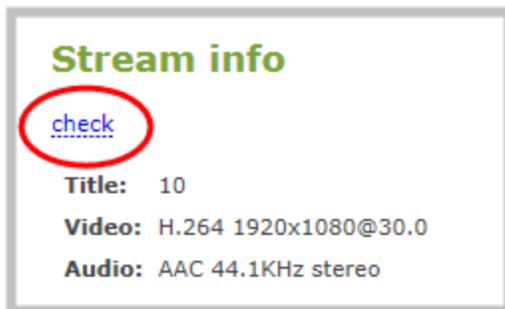
 **Source time and system time not synchronized.**

Video: H.264 1920x1080@30.1 6.55Mbps
Audio: AAC 44.1kHz stereo 3kbps

Packet loss statistics for last 10 minutes

	Expected	Received	Lost %
Video	400443	400443	0.00
Audio	5223	5223	0.00

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



Connect an SRT stream as an input

Secure Reliable Transport (SRT) is a low-latency protocol used to stream over the Internet to SRT destinations (decoders), such as CDNs and other SRT decoders.

You can configure Pearl Nano as an SRT destination (decoder) and ingest SRT streams as video inputs that you can add to custom layouts for switching, recording, and streaming.

- **Pearl Nano** - Pearl Nano cannot be used as a switcher.
- **Pearl Nano** - Only one video input on Pearl Nano can be from an SRT source.

When adding an SRT input, be sure to select the correct SRT mode. For example, if the SRT source stream is using rendezvous mode, ensure you set the SRT input in the Admin panel to rendezvous mode. If the SRT source stream is using caller mode, then set the SRT input in the Admin panel to listener mode. For more information about SRT modes, see [About streaming using SRT](#).

What's needed for this setup

- The IP address and SRT port of the SRT source (encoder) is needed for caller mode and rendezvous mode.
- For rendezvous mode, you must configure the SRT input to use the same port value as the SRT source. For an example SRT stream using rendezvous mode, see [Set up an SRT stream using rendezvous mode](#).

- For caller/listener modes, you must know which mode the SRT source uses and configure the SRT input on Pearl Nano to use the corresponding mode.
 - Caller mode can be used only for connection with the publicly accessed destination/source.
 - Listener mode can be used for connection with any source/destination (including within a local network behind the firewall).
 - For example, if the SRT source is in caller mode, then the input must be in listener mode. For an example SRT stream using caller/listener modes, see [Set up an SRT stream using caller and listener modes](#).
- If AES encryption and a passphrase is required, consult your IT administrator for this information. Pearl Nano supports 128 bits, 192 bits, and 256 bits AES encryption. Special characters are not supported in the passphrase.



If AES encryption and a passphrase is configured, ensure this information is provided to the SRT source. The SRT stream from the source must use the same AES and passphrase values, see [Set AES encryption and a passphrase for SRT](#).

Add an SRT stream as an input using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Inputs menu, select **Add input** and select **Add SRT input**. The SRT input configuration page opens.

3. In the **Connection mode** field, select the SRT mode:
 - a. For **Caller** mode, enter the following:
 - **URL** - the URL of the SRT source (encoder) using the format *srt://<encoder-ip-address>:<port>*, where the *<encoder-ip-address>* and *<port>* could be a Pearl device sending an SRT stream.
 - **Source port** - enter the port number for Pearl Nano to use for SRT traffic.
 - **Stream ID** - In the **Stream ID** field, enter a unique name for this stream.
 - b. For **Listener** mode, optionally enter the following:
 - Enter the **Port** number for this device to use for SRT traffic. See [Network ports used by Pearl Nano](#) to determine available ports.
 - c. For **Rendezvous** mode enter the following:
 - **URL** of the SRT source (encoder) using the format *srt://<encoder-ip-address>:<port>*, where the *<encoder-ip-address>* and *<port>* values are provided by the SRT encoder device.
4. Enter the following optional settings:
 - **Encryption** - select the check box and choose the AES **Key length** if the SRT destination requires AES encryption. These settings must match the encryption settings of the destination device.
 - **Passphrase** - Enter a passphrase if one is required along with AES encryption.
 - **Latency** - Add from 80 ms to 8000 ms of latency to the SRT stream. Increasing latency gives more time to buffer packets and resend any that got lost in transit to the destination. If the latency value set for the stream is too low and there is packet loss over the network, retransmission of lost packets will not be possible and the stream quality will suffer. If you require real-time responses from your audience, you should use as little latency as possible.
 - **Audio delay** - The audio delay feature helps you adjust audio coming from external sources so that your video and audio sources are synchronized when captured, streamed, and recorded. You can apply from -300 ms to +300 ms of delay. By default, there's 0 ms of delay applied to audio sources.
 - **No signal image** - Select an image to be displayed if there is no signal in the SRT stream. from the dropdown list. The **DEFAULT** image displays the words **NO SIGNAL**. To add a new image, select **Media** in the **Configuration** menu and click **Choose File**.
 - **Timeout** - Select an amount of time with no signal before the **No signal image** appears.
5. Click **Apply**.

We recommend using the default latency value for an initial test stream. After you perform a test stream, you can determine the Quality of Service (QoS) and calculate the latency requirements. To set the SRT stream latency, see [Adjust latency and view the SRT stream status](#).

Preview a video source using the Admin Panel

You can preview the images captured from your video sources in the Admin panel.

Preview an input source using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. Ensure a source is connected to the input port.
3. From the Inputs menu, click the **source name**. The configuration page for the source opens. A preview appears at the bottom of the page.

Rename an input port

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

Sometimes it's helpful to configure the input port name to match the data it's capturing so that it's clear what the channel is capturing. Alternately you can change the channel's name, see [Rename a channel](#).

For a complete list of international characters supported, see [International character support](#).

To change an input port name:

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Inputs** menu, click the source name. The configuration page for the source opens.
3. Click on the input port name that appears at the top of the page. The text turns red.
4. Enter the new name using alphanumeric characters. We recommend using underscores to separate words rather than using spaces.
5. Press **Enter** using your keyboard to save the new name.

Configure a video input source

Captured video sources don't usually need configuration, but you can change some of the video settings using the Admin panel.



- For HDMI inputs, see: [Video settings](#).
- For SDI inputs, see: [SDI video settings](#).

You can also configure networked video sources on your Pearl device.

- For RTSP sources, see: [Connect an RTSP source](#).
- For SRT sources, see: [Connect an SRT stream as an input](#).

Open the configuration page for an input source using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. Ensure a source is connected to the input port, see [About connecting video and audio sources](#).
3. From the Inputs menu, click the **source name**. The configuration page for the source opens.

Video settings

Value	Input type	Description
Scaling (Pearl Nano)	HDMI, DVI, SDI	Use this setting to scale the video input source. This is useful when adding multiple video sources in a custom layout such as picture in picture or side-by-side. The frame size selected for the video source is also what gets sent out the HDMI OUT port when you select the video input as the output source.
Image	HDMI, DVI, SDI	This menu allows you to choose a custom no-signal image for the channel. The drop-down list gives you the option to choose the default image or any image you have uploaded. See: Add a custom No Signal image .
Timeout	HDMI, DVI, SDI	The timeout represents the number of seconds after losing the signal that the no-signal is displayed. You may change this number to adjust how soon you wish the no-signal image to appear after the signal disappears.

¹Requires 4K feature add on

SDI video settings

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

Value	Description
Scaling	Use this setting to scale the video input source. This is useful when adding multiple video sources in a custom layout such as picture in picture or side-by-side. The

Value	Description
	frame size selected for the video source is what gets sent out the HDMI OUT port.
Image	This menu allows you to choose a custom no-signal image for the channel. The drop-down list gives you the option to choose the default image or any image you have uploaded. See: Add a custom No Signal image .
Timeout	The timeout represents the number of seconds after losing the signal that the no-signal is displayed. You may change this number to adjust how soon you wish the no-signal image to appear after the signal disappears.

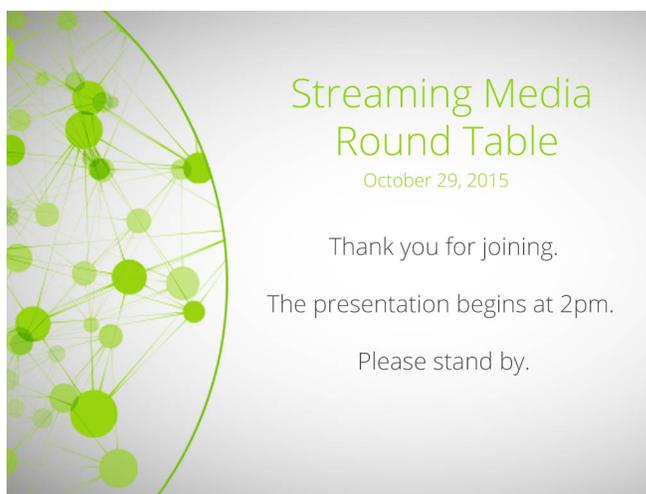
Add a custom No Signal image

By default the system displays a No Signal image when there is no video signal coming in to any of the video input ports on the Pearl device. You can customize this image to display a different message to your viewers. For example if a viewer logs in early, or if you are experiencing delays you could indicate the start time (or expected resolution time) using the no signal image.

Before you can specify a custom No Signal image for an input port on a Pearl device, you must upload the image. For more information, see [Upload or remove an image using the Media page](#).

Set the no signal image for an input port using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Inputs menu, click the **source name**. The configuration page for the source opens.
3. In the "**No signal**" **image** section, select an image from the **Image** drop down list.



4. In the Timeout field, enter the number of seconds before the No Signal image is displayed. If no manual value is entered, the default time to display is 5 seconds.
5. Click **Apply**.
6. Test that the No Signal image is correctly applied by disconnecting your source and previewing the channel(s) containing said source, see [Preview a channel](#).

Stream

Streaming is a powerful way to deliver live video content to your viewers. Stream to viewers, servers, and media players. Using the Admin panel, you can configure streaming in multiple formats to multiple destinations and devices, such as web browsers, media players, set-top boxes, Smart TVs, and Content Distribution Networks.

Pearl Nano is flexible, easy to setup, and supports all the standard codecs, as well as the most common media players. Streaming options include: unicast, multicast, SRT, HLS, RTMP, SAP, and more.

Topics include:

- [What is streaming?](#)
- [Viewing a channel's live broadcast stream](#)
- [Directly sharing channel stream URLs with viewers](#)
- [Suggested stream settings](#)
- [Streaming a channel direct to viewers](#)
- [Streaming to servers, CDNs, and other devices](#)
- [Streaming to a media player or smart TV](#)

For instructions on how to use Pearl Nano's front screen menu to start/stop scheduled CMS webcasts, see: [Stop/start scheduled CMS events using Pearl Nano's front screen menu](#).

For information about streaming to a Content Management Systems (CMS), like Kaltura or Panopto, see: [CMS recording and webcasting control](#).

What is streaming?

After you connect your camera, audio source, and set up a channel, it's time to stream your content live and share that with your viewers.

Epiphan products provide many different streaming options and supports a variety of streaming protocols. The easiest way to stream a single channel directly to viewers on the same local network is to share the channel's live broadcast URL. Various stream types are available so users can watch using their favorite devices, including: HTTP/HTTPS, HTTP FLASH (.FLV), MPEG-TS (HTTP), and RTSP.

At the same time, stream to a multicast server or CDN and reach viewers across the globe. You can even stream to smart TVs in overflow rooms using SAP. The streaming method you choose depends on factors like the number of viewers of your stream, are you broadcasting live over a local TCP-based network or streaming to a CDN over the Internet, how much bandwidth do you have available, and is live streaming security a concern?

Pearl Nano can stream to a CDN or media server using any of the following streaming protocols:

- SRT (push)
- HLS (push)
- RTMP/RTMPS (push)
- RTSP Announce

A channel can support multiple streams. That means you can stream a channel to multiple destinations using different streaming protocols. Unicast and multicast streams are also supported.

- **Pearl Nano** - start and stop streaming by using the Streaming button located on the front panel or directly from the Admin panel . You can also control streaming using Epiphan Edge.

In addition to streaming from the Pearl Nano, the following streaming formats are supported as input sources that the Pearl Nano can ingest:

- SRT
- RTSP

The Pearl Nano can use the REST API with third-party applications. See: [Pearl System REST API Guide](#).

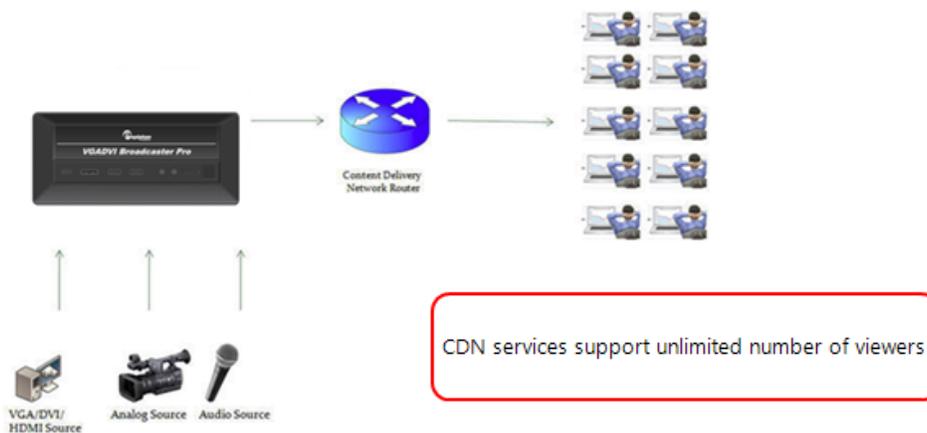
The Pearl Nano can use the Legacy RS-232 API or Legacy HTTP API with third-party applications. See: [Pearl System Legacy RS-232/HTTP API Guide](#).

Additional considerations

- Are you streaming live video or recorded video?
- Do you need to stream the content to one client (peer-to-peer) or deliver a single stream to multiple clients (multicast)?
- Do you need to provide web-based streaming that multiple clients can access using a Content Distribution Network (CDN), such as YouTube or Facebook Live?
- Do you need to encrypt your live stream for higher security?
- Streaming to a Content Management System (CMS) like Kaltura or Panopto? See: [CMS recording and webcasting control](#).

Streaming to a CDN, multicasting, and streaming to multiple destinations

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 and you don't have to worry about maintaining your own video streaming servers on site.



Streaming content to a multicast IP address is different than streaming to a CDN. Multicasting lets you directly share the stream with multiple viewers on 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. Multicasting is useful for training sessions when there is a specific time frame for the audience to view the content live.

Pearl Nano can publish to multiple destinations at the same time. Do not use Motion JPEG (MJPEG) encoding when streaming a channel to CDNs and multicast streaming at the same time. For more information, see [Configure video encoding](#).

Publishing Options	Use this option to...
Content Distribution Network (CDN)	<p>Stream web content to many viewers on different Content Delivery Networks simultaneously to any geographical location. Using a CDN to host your broadcast is highly scalable and saves you from having to purchase and maintain your own servers to host and deliver video content.</p> <p>Using one or more CDNs to stream live content allows you to reach a large geographically diverse audience and because CDNs perform format conversion, the stream is platform independent.</p> <p>Streaming protocols supported include: SRT (push), HLS (push), RTMP/RTMPS, .</p> <p>For more information about streaming to a CDN, see Streaming to servers, CDNs, and other devices.</p>
Multicast Streaming	<p>This delivery method relies on network equipment that supports multicasting and is usually used on high bandwidth corporate LANs and not on Internet-based architectures.</p> <p>Multicasting is what's typically used to stream video and audio to an IP TV or set-top box playlist. If you're streaming over a Gigabit Ethernet network to a 10/100 Mbps set-top box that is dropping frames, you can limit the stream's bandwidth, see Set up traffic shaping.</p> <p>Multicast streaming protocols supported include: MPEG-TS UDP, MPEG-TS RTP/UDP, and RTP/UDP.</p> <p>For more information about using multicasting for streaming your content, see Multicast streaming.</p>



To stream video outside of your LAN, use a CDN or configure port forwarding on your router. Consult your Network Administrator to set up port forwarding.

By default, no streaming is configured for the channels configured on Pearl Nano.

Publishing to a CDN

When you publish a stream to a CDN provider, make sure you use a streaming protocol that the CDN supports. Contact your CDN for a list of supported streaming protocols and audio codecs they support.

To publish content to a CDN provider, ensure you have:

- the URL (or path) to the mount point or an XML configuration file (provided by the CDN provider)
- the supported transport protocols, audio codecs, and any other settings like key frame rates and bit rates recommended by the CDN provider
- See [Suggested stream settings](#) for the best streaming settings for Pearl Nano.

You can control streaming to a CDN using the Admin panel. You can also use:

- Pearl Nano - Streaming button on the front panel.

For more information see [Start and stop streaming to a CDN](#).

You can also test how your content is streamed by sending your content to Epiphan's CDN. For a list of Epiphan's preferred CDN providers, see: <https://www.epiphan.com/partners/cdn-partners/>.

Streaming to multiple destinations

Pearl Nano supports streaming to multiple destinations. A stream uses the channel's encoding settings. Therefore, all streams you create for the channel have the same encoding settings.

Directly sharing channel stream URLs with viewers

People on the same local network as Pearl Nano can easily view a channel's live broadcast stream. All you need to do is provide the channel's stream URL and log in credentials for viewers, see [Change user passwords](#).

Choose the right type of URL for the type of device the person will use to watch the stream. Viewers can watch the stream using a digital media player or browser. For more information on supported streaming formats and devices, see [Viewing a channel's live broadcast stream](#).

MPEG-TS: Used in broadcast systems such as DVB, ATSC and IPTV. It is supported by media players such as MPlayer, VLC and KMPlayer.

FLV: Supported on most web browsers and media players. Supports the H.264 standard and analog audio from an external source.

Stream info

Live broadcast: <http://10.3.1.70/preview.cgi?channel=1>

```
Video: H.264 1920x1080@30, 1.50 Mbps
Actual framerate: 30.00
Audio: AAC 48kHz stereo 128 kbps
Total: 1.63 Mbps
Flash stream http://10.3.1.70:8000/stream.flv
MPEG-TS stream http://10.3.1.70:8000/stream.ts
RTSP stream (UDP/TCP) rtsp://10.3.1.70:554/stream.sdp
RTSP stream (TCP) rtsp://10.3.1.70:554/stream_tcp.sdp
```

RTSP: Supported by most media players including QuickTime, MPlayer and VLC. Supports H.264, MPEG4, and analog audio from an external source.

RTSP (UDP/TCP): Client chooses UDP or TCP as the preferred protocol.

RTSP (TCP): Use TCP to stream RTSP to the client.

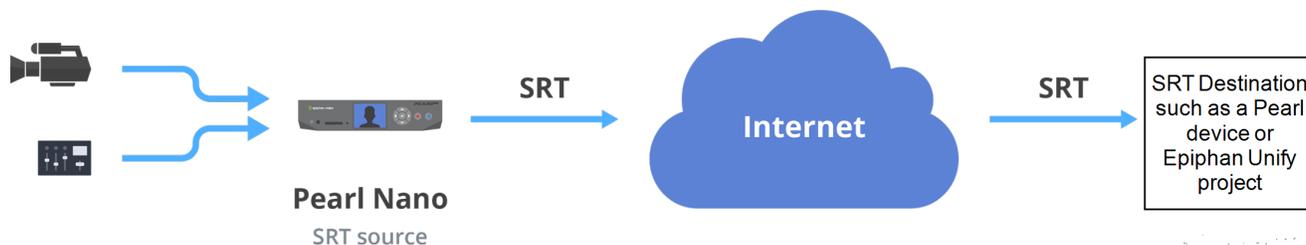


HTTP is used for MPEG-TS and FLV streaming. HTTPS is not supported.

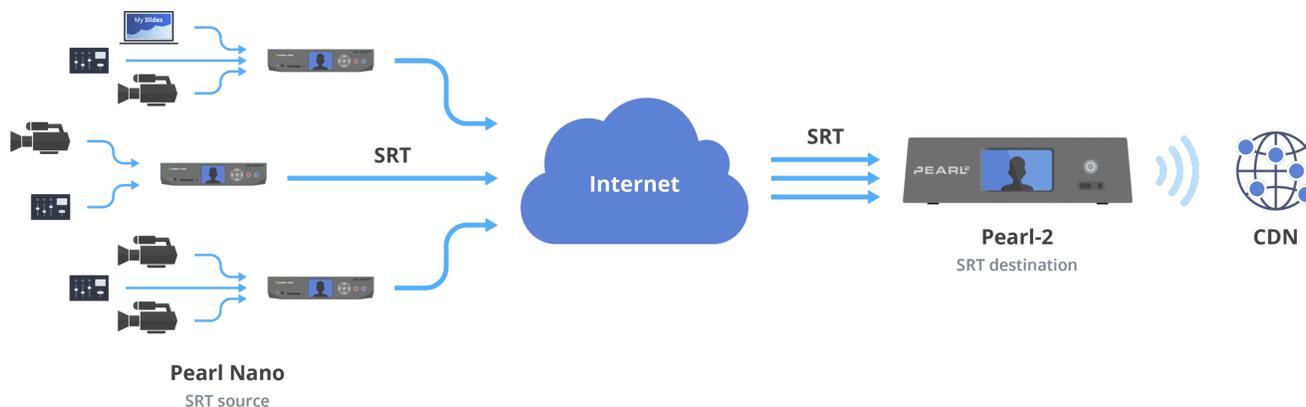
About streaming using SRT

Secure Reliable Transport (SRT) is an open-source streaming protocol that offers quality, low-latency streaming to CDNs and other SRT enabled decoders across unreliable Internet connections using User Datagram Protocol (UDP) transport and additional error checking. Low-latency SRT is particularly good for real-time, two-way communications between a remote guest and a local on-site host.

You can configure Pearl Nano as an SRT source encoder and stream video using SRT. You can also configure Pearl Nano as an SRT decoder and ingest SRT streams as video inputs. Up to one of the video inputs you configure for Pearl can be from an SRT source and Pearl Nano can stream up to three SRT streams.



Pearl Nano as SRT source encoders in a multiple-source setup.



Before content is streamed between the SRT source and destination, a communication link must be established between them for SRT control and recovery packets. Any firewalls blocking the path must be traversed.

SRT streaming modes and firewalls

Streaming through firewalls can be a challenge. With SRT you get easy firewall traversal with little to no IT involvement.

SRT offers three modes to simplify the process: Rendezvous, Caller, and Listener.

- Rendezvous mode is the easiest to setup and usually doesn't need any intervention from your IT administrator for the SRT stream from the source to traverse the firewall to the destination. The SRT source and destination devices must use the same SRT port value, see [Set up an SRT stream using rendezvous mode](#).
- Caller and Listener modes work together to establish the SRT connection between your source and destination devices when traversing the firewall is difficult. In this case, your IT network administrator must configure the network to allow traffic that comes in on the port configured for SRT streaming and forward the traffic to the destination device, see [Set up an SRT stream using caller and listener modes](#).



The device you set as the Caller (or Listener) is arbitrary, as long as one device is a Listener and the other is a Caller. To establish the SRT connection between a source and destination device in rendezvous mode, both devices must be configured and ready to establish the connection between them.

SRT latency controls and AES stream encryption

SRT includes latency controls to adjust for poor network quality while maintaining an acceptable amount of delay. Pearl Nano provides statistics to determine the amount of packet loss. Using the Admin panel, you can increase or decrease the amount of latency applied to the stream to help mitigate any Quality of Service (QoS) issues. The default latency values are 125 ms for an SRT stream and 80 ms for an SRT input, see [Adjust latency and view the SRT stream status](#).

For greater security, you can set the SRT stream to 128 bits, 192 bits, or 256 bits AES encryption. Encryption settings must be set to the same values on both the SRT encoder sending the stream and the SRT decoder that's receiving the stream, see [Set AES encryption and a passphrase for SRT](#).

Secure streaming

Secure streaming is a great option for confidential content, such as corporate meetings or internal employee training. There are several ways to secure your live stream.

- Stream to a CDN or media server over the Internet using Secure Reliable Transport (SRT).
- Stream to a CDN or media server over the Internet using Real Time Messaging Protocol Secure (RTMPS).
- Stream HLS (push) over local HTTPS networks.

SRT streaming includes additional AES encryption settings for even more security. You can set the SRT stream for 128 bits, 192 bits, or 256 bits AES encryption. Encryption settings must be set to the same values on both the SRT encoder sending the stream and the SRT decoder that's receiving the stream, see [Set AES encryption and a passphrase for SRT](#).

RTMPS wraps the RTMP stream in TLS/SSL packets before it's transported over a TCP connection between the network server and the Pearl device(i.e. the client). To set up secure streaming using RTMPS, see [Set up an RTMP or RTMPS \(push\) stream](#).

Suggested stream settings

When you're setting up your live stream, you would typically consult your CDN or publishing destination for their recommended settings to use.

Stream setup can be a matter of balancing quality and system resources. When choosing your stream settings, it's important to consider the type of content you're streaming and the streaming protocol you've chosen.

For streaming fast moving video, a higher bitrate and frame rate delivers a better image. If you're streaming a slide presentation, you can save bandwidth and system processing by lowering the bitrate and frame rate without any noticeable image degradation.

The following table provides suggested settings to maximize your video quality while minimizing system resource usage when streaming video content from Pearl Nano.

Table 46 Suggested stream settings for video

Option	Setting
Codec	Pearl Nano - H.265
Video encoding preset	Hardware accelerated (this is the only option on Pearl Nano)
Video encoding profile	Pearl Nano - Main
Key frame interval	2 sec ¹
Limit frame rate	30 ¹
Bitrate	Pearl Nano: <ul style="list-style-type: none"> • 6000 kpbs for Full HD • 24 Mbps for 4K UHD^{4K}
Audio format	AAC 44 KHz ¹

¹For HLS streaming, the key frame interval should be set to 2s and the frame rate should be set to 30 fps for live NTSC content.

The following table provides suggested settings to maximize your stream quality while minimizing system resource usage when streaming a slide presentation from a PC, Mac, or tablet.

Table 47 Suggested stream settings for slides

Option	Setting
Codec	Pearl Nano - H.265
Video encoding preset	Hardware accelerated (this is the only option on Pearl Nano)
Video encoding profile	Pearl Nano - Main
Key frame interval	2 sec
Limit frame rate	30
Bitrate	Pearl Nano: <ul style="list-style-type: none"> • 3000 kpbs for HD • 24 Mbps for 4K UHD^{4K}
Audio format	AAC 44 KHz

Streaming a channel direct to viewers

Stream content directly to viewers on the local network using the default streaming settings as soon as you've powered on the system and configured a channel. Just choose the live broadcast method that's right for your viewers. They can tune into the stream and watch using their favorite web browser or media player.

Table 48 Publishing options for streaming direct to viewers on the local network

Publishing Options	Use this option to...
HTTP or HTTPS	<p>Viewers on the same local network as Pearl Nano can access the Live broadcast URL using a web browser on the local network and are instantly connected.</p> <p>Viewers can also choose to use their favorite media player to watch the stream on the local network. They just need the URL for any of the other supported streaming methods (like FLV or MPEG-TS) to watch using their media player.</p> <p>Use these direct streaming methods for only a small number of viewers because each viewer uses the full stream bandwidth and consumes resources on Pearl Nano. For more information about using an HTTP stream, see Share a live broadcast stream (HTTP, HTTPS, or RTSP).</p>
RTSP	<p>Viewers can copy and paste the URL of the RTSP stream into a media player and watch the stream on the local network. For more information about using RTSP streaming, see Share a live broadcast stream (HTTP, HTTPS, or RTSP).</p>
HTTP Live Streaming (HLS) pull	<p>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. If HTTPS is configured on Pearl Nano, traffic from port 80 is redirected to port 443. See Enable HLS (pull) for details.</p> <p>There is approximately a 30 second delay when streaming using HLS.</p>



To stream video outside your LAN using the channel's HTTP/HTTPS or RTSP URLs, you must configure port forwarding on your router. Consult with your Network Administrator.

To set up Pearl Nano for direct streaming to viewers, see:

- [Disable and enable direct channel streaming](#)
- [Restrict viewer access to channel streams](#)
- [Share a live broadcast stream \(HTTP, HTTPS, or RTSP\)](#)

- [Change HTTP and RTSP streaming port values](#)
- [Enable HLS \(pull\)](#)

Share a live broadcast stream (HTTP, HTTPS, or RTSP)

The easiest way to deliver your content to your viewers is to give them the live broadcast URL of the channel. You can get that using the Admin panel. A separate URL exists for each channel you stream.

The format of the URL depends on the method you used to access Pearl Nano, which can be done though network discovery using a Pearl device's serial number or IP address. The Pearl Nano must be accessible on the viewer's LAN for them to access and view the stream using serial discovery.

If HTTPS is configured, the live broadcast URL will start with *https* instead of *http*.



If Pearl Nano is behind a firewall and you want to share a stream with remote viewers, you need to set up port forwarding on your network. Consult with your network administrator.

Table 49 URL options

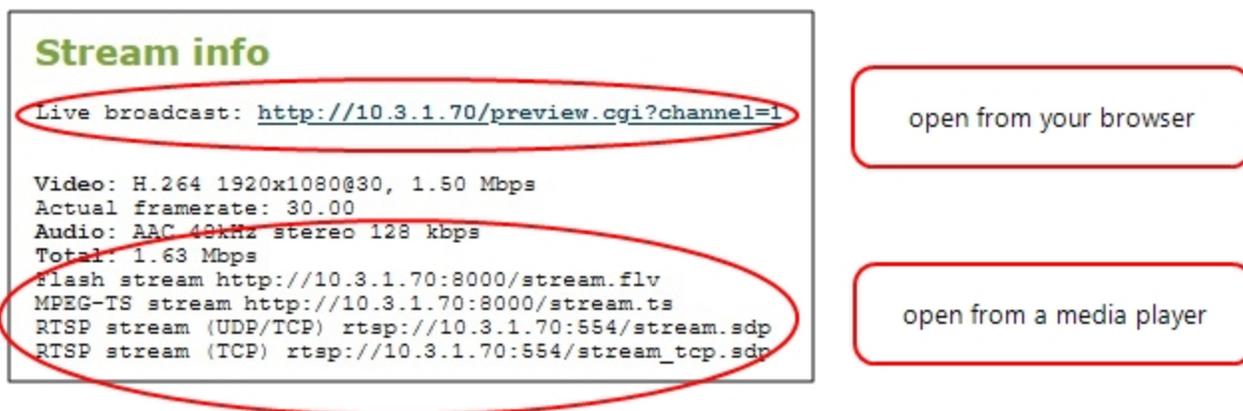
Access Method	URL Format
serial discovery	<div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px;"> <pre>http://<serial>.local/preview.cgi?channel=<channel number> https://<serial>.local/preview.cgi?channel=<channel number> rtsp://<serial>.local:<port>/stream.sdp</pre> </div> <p>Where <i>serial</i> is the serial number of the system, the <i>port</i> number for the channel is found on the Info page, and the channel number is provided from the Admin panel.</p> <p>You must install Bonjour Print Services on your Windows or Mac computer to access the live Preview using the serial number.</p>
IP address	<div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px;"> <pre>http://<IP Address>/preview.cgi?channel=2 https://<IP Address>/preview.cgi?channel=2 rtsp://<IP Address>:<port>/stream.sdp</pre> </div> <p>Where <i>IP address</i> is the IP address of the system, the <i>port</i> number for the channel is found on the Info page, and the channel number is provided from the Admin panel.</p>

An RTSP stream is supported by most media players such as QuickTime and VLC. You can choose from two RTSP transport protocol options.

- **RTSP (UDP/TCP):** The client chooses UDP or TCP as the preferred transport protocol. The preferred option for Pearl Nano is UDP, which is a connectionless transport protocol that does minimal error checking for less delay when transporting packets. UDP is suitable for use with stable, low-loss networks.
- **RTSP (TCP):** Uses TCP as the transport protocol. Use TCP if your network connection is lossy and would benefit from the error-checking and packet-loss retransmission that TCP performs.

Retrieve the stream URL for your viewers using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Status**. The Status page appears.



Stream info

Live broadcast: <http://10.3.1.70/preview.cgi?channel=1>

Video: H.264 1920x1080@30, 1.50 Mbps
 Actual framerate: 30.00
 Audio: AAC 48kHz stereo 128 kbps
 Total: 1.63 Mbps

Flash stream <http://10.3.1.70:8000/stream.flv>
 MPEG-TS stream <http://10.3.1.70:8000/stream.ts>
 RTSP stream (UDP/TCP) <rtsp://10.3.1.70:554/stream.sdp>
 RTSP stream (TCP) rtsp://10.3.1.70:554/stream_tcp.sdp

open from your browser

open from a media player

3. Record the **Live broadcast**, **RTSP stream** URL or other web streaming address. This is the address you can send to viewers or use to create a link to your broadcast.

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

Enable HLS (pull)

Stream a live broadcast of a channel directly to viewers on the same local network as Pearl Nano using HTTP over port 80. This gives viewers with iOS devices convenient access to the channel's live broadcast. If HTTPS is configured for Pearl Nano, the traffic from port 80 is redirected to HTTPS port 443.

HTTP Live Stream (HLS) supports the H.264 codec (and H.265 on Pearl Nano) and MP3 or AAC audio encoding. Audio and video are sent as a series of small files called media segment files. You can set the segment duration, as well as define the playlist size using the Admin panel. By default, the segment duration is 9 seconds and the playlist size is 3.

When live broadcasting a channel using HLS (pull), there is approximately a 30 second delay.

Enable HLS (pull) streaming using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channel(s) menu, select the channel containing video you want to stream and click **Streaming**. The Streaming configuration page opens.
3. Under **HTTP Live Streaming (HLS)**, check **Enabled**.
4. (Optional) Set the **Segment duration** and **Playlist size**.
5. (Optional) Check **Bypass stream access control for HLS video data** to allow the viewer software to read the HLS stream's video data without having to provide a viewer password or LDAP authentication as configured on Pearl Nano. A viewer password or LDAP authentication that is configured on Pearl Nano is still needed to access the HLS stream's playlist.



Try enabling this option if your viewer is unable to access the HLS stream when a viewer password or LDAP authentication is configured on Pearl Nano.

6. Click **Apply**
7. To share the HLS (pull) URL with viewers, click **Status** from the Channels menu, then copy the HLS URL and provide that to your viewers.

Services state

```
Encoder: up 9 seconds
Broadcaster: up 11 seconds
HTTP Live Streamer: up 11 seconds
Recorder: disabled
```

Stream info

```
Live broadcast: http://192.168.1.57/preview.cgi?channel=1
HTTP Live Streaming: http://192.168.1.57/hls/channel1

Video: H.264 1024x768@30, 6.00 Mbps
Actual framerate: 30
Audio: MP3 22kHz mono 128 kbps
Total: 6.13 Mbps
RTSP stream rtsp://192.168.1.57:554/stream.sdp
MPEG-TS stream http://192.168.1.57:8000/stream.ts
Flash stream http://192.168.1.57:8000/stream.flv
HLS stream http://192.168.1.57/hls/channel1/stream.m3u8
```

Open the link using a media player

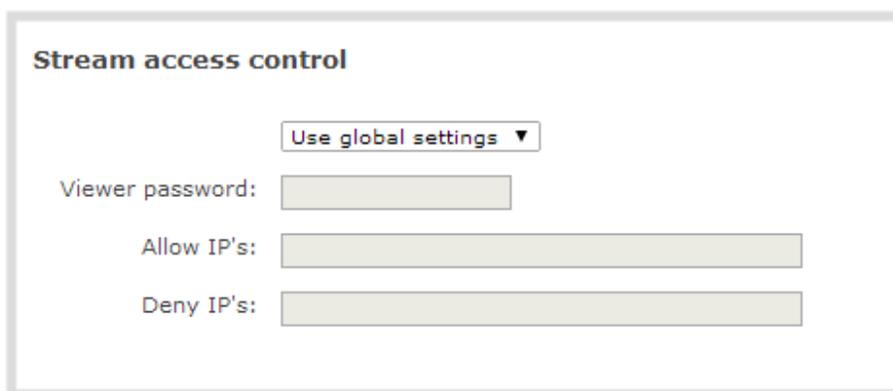
Restrict viewer access to channel streams

Your Pearl device can restrict access to all viewer streams from the channel using global viewer passwords and IP allow/deny lists. see [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 user authentication](#) for more information on LDAP configuration.

Restrict viewers for a channel using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channel(s) menu, select the channel and click **Streaming**. The streaming configuration page opens.
3. In the **Stream access control** section, select **Use these settings** from the drop down.



To return the channel to the global access control settings, select **Use global settings** from the drop down and click **Apply**. The configuration fields are disabled and any changes to the configuration fields are not saved.



Global LDAP settings are always enforced. Any local settings are in addition to LDAP sign on.

4. (Optional) Specify a password for viewers of this channel. The password is masked as you enter it.

 If you have global allow/deny lists or a global user password, you can override the global settings and remove all access control for a channel by selecting **Use these settings** and leaving all the fields blank.

5. (Optional) Enter the allow and deny IP addresses for viewers of this channel. see [Restrict viewers by IP address](#) for details about allow and deny lists.
6. Click **Apply**.

Restrict viewers by IP address

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

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

Table 50 IP Based Restriction Options

Item	Description
Allow IP's	<p>Users connecting from addresses in this list are permitted to view broadcasts from the device, 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>Users connecting from addresses in this list are not allowed to view broadcasts from the device, 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>

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

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

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

If you're not familiar with creating allow/deny lists, see [IP restriction examples](#).



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

Restrict viewer access to watch streams on a channel by their IP address

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channels menu, select a channel and click **Streaming**. The channel's streaming configuration page opens.
3. From the **Stream access control** drop-down, select **Use these Settings** to enable local password and Allow/Deny IP lists are enabled.
4. (Optional) Enter a password for the viewer in the **Viewer Password** field.
5. Enter the allowed IP addresses or address ranges in the **Allow IP's** field and enter denied IP addresses or address ranges in the **Deny IP's** field. Separate addresses with a comma. To specify a range, use a hyphen (-). Optional spaces improve readability.
6. Click **Apply**.

IP restriction examples

The following table lists some sample allow lists.

Table 51 Example allow lists

Example	Description
Allow list with distinct IP addresses	<p>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.</p> <p>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:</p> <div style="border: 1px solid #ccc; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Allow: 192.168.1.50, 192.168.1.51, 192.168.1.75</p> </div>

Example	Description
<p>Allow list with a range of IP addresses</p>	<p>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:</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Allow: 192.168.1.200-192.168.1.250</p> </div> <p>Note that we could have specified two of the IP addresses in the previous example as a range.</p>
<p>Allow list with a range of IP addresses and one or more specific IP addresses</p>	<p>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:</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Allow: 192.168.1.200-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75</p> </div> <p>Your list can have multiple ranges and multiple distinct IP addresses, provided they are separated by commas.</p>
<p>Allow list with a range of IP addresses, distinct IP addresses, and an exception</p>	<p>Building on the previous examples, consider a situation where you want the CEO's computers (192.168.1.50, 192.168.1.51, 192.168.1.75) 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:</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Allow: 192.168.1.200-192.168.1.250, 192.168.1.50-192.168.1.51, 192.168.1.75</p> <p style="text-align: center;">Deny: 192.168.1.211</p> </div>

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

The following table lists some sample deny lists.

Table 52 Example deny lists

Example	Description
Deny list with distinct IP addresses	<p>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.</p> <p>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:</p> <div data-bbox="532 926 1446 1020" style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Deny: 192.168.1.211</p> </div> <p>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.</p>
Deny list with a range of IP addresses	<p>Consider a situation where you want every computer on the network to access the broadcast, with the exception of the CEO's desktop, laptop and tablet computers. Additionally, boardroom computers should not be permitted with the exception of the cafeteria computer (IP address 192.168.1.222).</p> <p>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:</p> <div data-bbox="532 1619 1446 1818" style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Allow: 192.168.1.1-192.168.1.250</p> <p style="text-align: center;">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</p> </div>

Change HTTP and RTSP streaming port values

You can use the Admin panel to configure a specific streaming port value for the channel. Ensure that each channel has unique streaming port values that are not currently assigned to any other process, see [Network ports used by Pearl Nano](#).

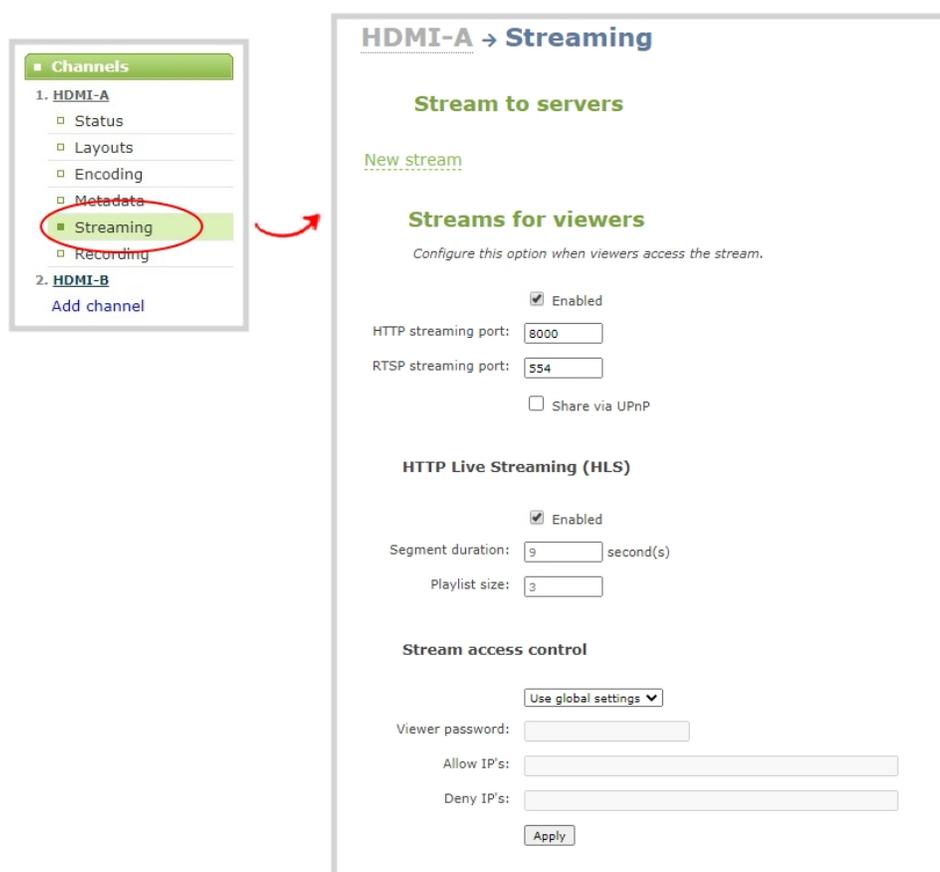
By default, each channel you create is assigned a unique HTTP and RTSP port number. You cannot create channels on the Pearl Nano.

For RTSP streaming directly to users on your LAN, the only information that's needed to view the broadcast is the URL and the RTSP port number used to stream the broadcast.

HTTP port numbers are used for FLV and MPEG-TS streaming methods.

Set the HTTP and RTSP streaming ports for streaming to viewers on the local network

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Streaming**. The Streaming page opens.



The image shows two screenshots from the Pearl Nano Admin panel. The left screenshot shows the 'Channels' menu with 'Streaming' selected for channel 'HDMI-A'. A red circle highlights the 'Streaming' option, and a red arrow points to the right screenshot. The right screenshot shows the 'HDMI-A → Streaming' configuration page. It has sections for 'Stream to servers', 'Streams for viewers', 'HTTP Live Streaming (HLS)', and 'Stream access control'. The 'Streams for viewers' section is expanded, showing 'Enabled' checked, 'HTTP streaming port' set to 8000, 'RTSP streaming port' set to 554, and 'Share via UPnP' unchecked. The 'HTTP Live Streaming (HLS)' section shows 'Enabled' checked, 'Segment duration' set to 9 seconds, and 'Playlist size' set to 3. The 'Stream access control' section shows 'Use global settings' selected, 'Viewer password' empty, 'Allow IP's' empty, and 'Deny IP's' empty. An 'Apply' button is at the bottom.

3. Set the **HTTP Streaming port** to specify the port used to stream the HTTP broadcast. This value along with the URL is used by viewers to access the FLV and MPEG-TS streams.



The port number must be higher than 500 for HTTP. In the case of RTSP streaming this value is ignored.

4. Set the **RTSP Streaming port** to specify which port to use when you are streaming live video via RTSP. This value along with the URL is used by viewers to access the broadcast. The default for channel one is 554.
5. Click **Apply**.

Disable and enable direct channel streaming

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

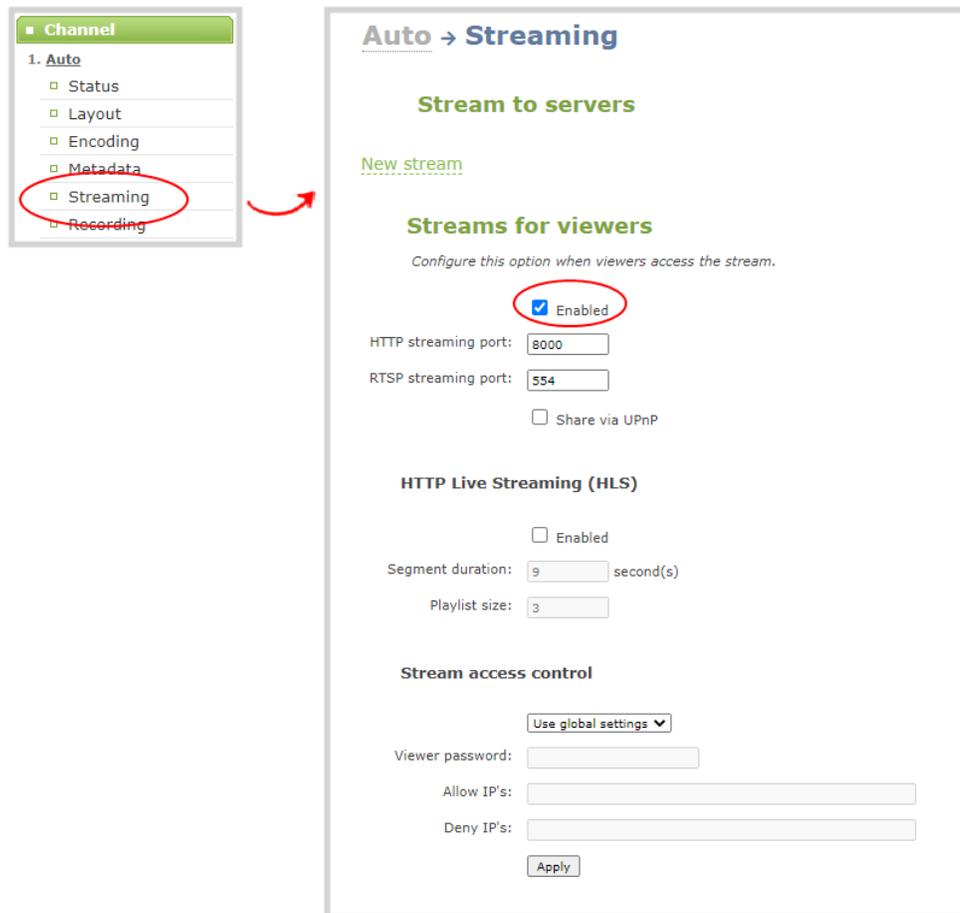
Disabling channel streaming for viewers using their web browser or media player does not disable live streaming to a CDN.



Disabling streams for viewers does disable all viewer formats, including: HTTP/HTTPS, RTSP, and HLS.

Disable or enable the channel streaming URLs using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channel menu, select a channel and click **Streaming**. The streaming page opens.



3. Beneath **Streams for viewers**, uncheck **Enabled** to disable direct streaming of channels to viewers using the channel's streaming URLs. Leave **Enable** checked to allow direct streaming using the channel's URLs.
4. Click **Apply**.

Viewing a channel's live broadcast stream

When you set up a channel, the system automatically generates and displays a list of available live broadcast streams. You can share the channel's stream URLs with people on the same local network as Pearl Nano so they can watch a live broadcast of the channel. All you need to do is provide them the channel's stream URL and log in credentials if you've set one for viewers, see [Change user passwords](#).



To stream video outside your LAN using the channel's live broadcast streams, you must configure port forwarding on your router. Consult with your Network Administrator.

The live broadcast stream URLs for a channel are available from the Channel menu in the Admin panel when you select **Status**. The audio and video codecs configured for the channel affect which live broadcast formats are listed.

Stream info

Live broadcast: <http://10.2.3.72/preview.cgi?channel=1>

Video: H.264 1920x1080@30, 5.60 Mbps
 Actual framerate: 30
Audio: AAC 48kHz stereo 320 kbps
Total: 5.92 Mbps
 Flash stream <http://10.2.3.72:8000/stream.flv>
 MPEG-TS stream <http://10.2.3.72:8000/stream.ts>
 RTSP stream <rtsp://10.2.3.72:554/stream.sdp>

Copy, paste, and share URL
addresses with viewers

Just copy the live broadcast URL and share that with viewers so they can watch the channel stream using a web browser, see [View the live broadcast URL using a web browser](#).

Or choose one of the other channel stream URLs if your viewers prefer to watch using a media player, see [View the streaming URL using a media player](#).

MPEG-TS: Used in broadcast systems such as DVB, ATSC and IPTV. It is supported by media players such as MPlayer, VLC and KMPlayer.

FLV: Supported on most web browsers and media players. Supports the H.264 standard and analog audio from an external source.

Stream info

Live broadcast: <http://10.3.1.70/preview.cgi?channel=1>

Video: H.264 1920x1080@30, 1.50 Mbps
 Actual framerate: 30.00
Audio: AAC 48kHz stereo 128 kbps
Total: 1.63 Mbps
 Flash stream <http://10.3.1.70:8000/stream.flv>
 MPEG-TS stream <http://10.3.1.70:8000/stream.ts>
 RTSP stream (UDP/TCP) <rtsp://10.3.1.70:554/stream.sdp>
 RTSP stream (TCP) rtsp://10.3.1.70:554/stream_tcp.sdp

RTSP: Supported by most media players including QuickTime, MPlayer and VLC. Supports H.264, MPEG4, and analog audio from an external source.

RTSP (UDP/TCP): Client chooses UDP or TCP as the preferred protocol.

RTSP (TCP): Use TCP to stream RTSP to the client.



If the channel is configured with 48 kHz audio, some web browsers may not work. In this case, we recommend using one of the channel's other URL formats and viewing the channel stream using a media player instead.

View the live broadcast URL using a web browser

You can share a channel's live broadcast URL with viewers so they can watch your live stream using their favorite web browser. Your viewers must be on the same network as Pearl Nano to watch a live broadcast using the channel's live broadcast URL.



If the channel you're streaming is configured with 48 kHz audio, some web browsers may not work. In this case, we recommend viewing the channel stream using a media player instead.

The live broadcast URL appears in two places in the Admin panel:

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

To locate the IP address for the broadcast, see [Directly sharing channel stream URLs with viewers](#) .

If a viewer password is configured, provide participants with the password to log in, along with the URL of the stream. To set a viewer password, see [Change user passwords](#).

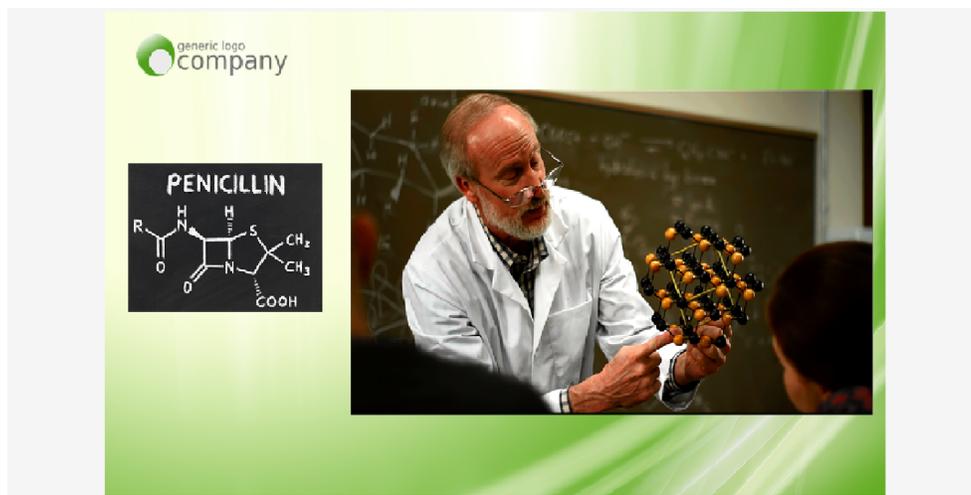


If HTTPS is enabled on Pearl Nano, replace *http* with *https* in the URL of the stream.

Share the live broadcast URL with viewers

1. Login to the Admin panel as **admin** or **operator**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Status**. The **Live broadcast** link is listed under **Stream info**. You can copy the Live broadcast URL and share that with your viewers.
3. Alternatively, open the **Info** page to get the live broadcast URL. From the Configuration menu, click **Info** and then click **View** on the far right of the channel you want to share the broadcast URL.

A page opens displaying the live broadcast and the broadcast URL. Copy the URL and share that with your viewers.



Watch a stream using a web browser and the live broadcast URL

1. From your web browser, enter the IP address of the live broadcast stream.

If the IP address of the broadcast is 172.20.1.33, then browse to:
`http:// 172.20.1.33/preview.cgi?channel=<channel number>`

2. Enter **viewer** as the user name and the password when prompted and press **Enter**. The stream plays in a new tab in your web browser.

View the streaming URL using a media player

You can share a channel's streaming URL with viewers so they can watch your live stream using their favorite media player, like VLC. Your viewers must be on the same network as Pearl Nano to watch a channel stream using a stream URL.

The different stream types available for channels include: RTSP, MPEG-TS, and Flash streams, see [Viewing a channel's live broadcast stream](#). The URL contains either the IP address of Pearl Nano or the serial number, see [Connect to the Admin panel](#).

The type of stream URL you provide to your viewers can affect their choice of media player needed to watch the stream.

This procedure assumes that the VLC media player is used.

If a viewer password is configured, provide participants with the password to log in, along with the URL of the stream. To set a viewer password, see [Change user passwords](#).

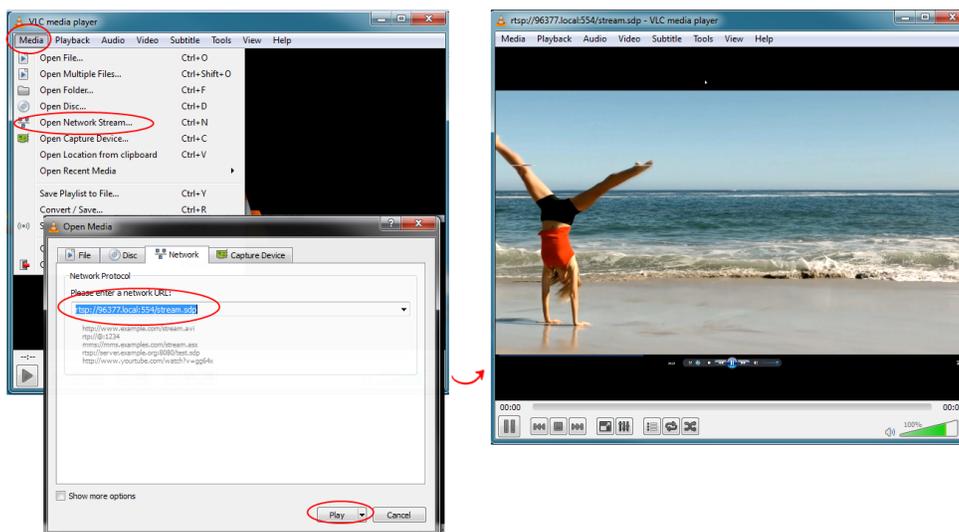
Share the channel's stream URL with viewers

1. Log in to the Admin panel as **admin** or **operator**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Status**. You can copy the Live broadcast URL and share that with your viewers.

View the channel's stream URL using a VLC

1. Launch a media player.
2. Click the **Media** tab and select **Open Network Stream** from the drop-down menu.
3. Enter the stream URL. In this example, the serial number method is shown.

```
rtsp://.local:554/stream.sdp
```



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

Streaming to servers, CDNs, and other devices

Pearl Nano can stream to CDNs, local media servers, and even to other Pearl Nano devices that are acting as a streaming ingestion point. Pearl Nano supports many streaming protocols. Use the Admin panel to set up individual channels for streaming.

Topics include:

- [Set up an RTMP or RTMPS \(push\) stream](#)
- [Set up an SRT stream using caller and listener modes](#)
- [Set up an SRT stream using rendezvous mode](#)
- [Adjust latency and view the SRT stream status](#)
- [Set AES encryption and a passphrase for SRT](#)
- [Set up an HLS \(push\) stream](#)
- [Set up an RTSP announce stream](#)
- [Start and stop streaming to a CDN](#)

For details to configure multicast streaming, see [Multicast streaming](#). For more information on video encoding configuration, see [Configure encoding](#).

Set up an RTMP or RTMPS (push) stream

Real Time Messaging Protocol (RTMP) is this the most common way to stream to a CDN, including to Facebook Live and YouTube.

Use Real Time Messaging Protocol Secure (RTMPS) on your Pearl Nano to encrypt content before it's streamed over a TLS/SSL connection for secure live streaming. When enabled, Pearl Nano will always attempt to validate the digital certificate it receives from the CDN to establish a secure RTMPS connection. The connection will fail if Pearl Nano can't find the CA certificate of your CDN in it's list of certificates.

Pearl Nano has the CA certificates for many of the major CDNs already installed. For RTMPS streaming to work for your particular CDN, or if you're using a proprietary RTMPS server, ensure that your streaming server's CA certificate is uploaded to Pearl Nano, see [Manage CA and self-signed certificates](#).

Set up an RTMP or RTMPS stream using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Streaming**. The Streaming configuration page opens.
3. Click **New stream** and choose **RTMP push**. The new stream is created using the default name *Stream 1*.
4. Click the stream name to see the stream settings.
5. Enter the **URL** of the ingestion point provided by the CDN or media server.
 - For RTMP push, enter **rtmp** followed by the rest of the URL, for example: *rtmp://<server-ip-address>:<port>/etc...*
 - For RTMPS, enter **rtmps** followed by the rest of the URL, for example: *rtmps://<server-ip-address>:<port>/etc...*
6. Enter the **Stream name** (which also is called a stream key by some CDNs)
7. (Optional) 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. Some CDNs, like YouTube and Facebook Live, do not require you to enter your log in credentials here.

8. (Optional) Rename the stream. Click the current name and enter a different name, then press **Enter**.



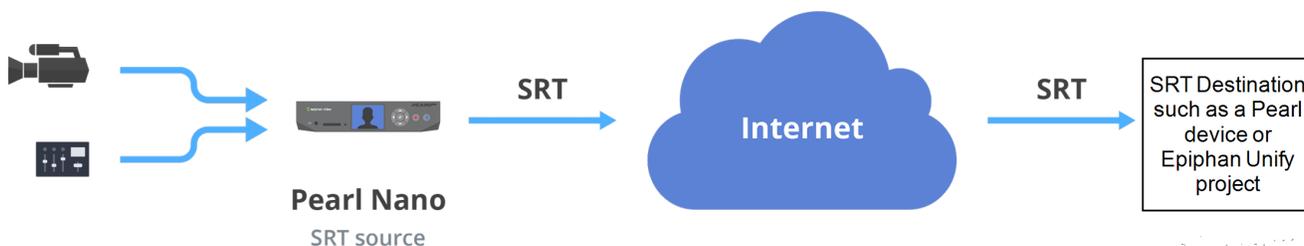
Refresh your browser if the new stream name doesn't immediately display.

9. Click **Apply**.
10. To start streaming, click **Start** or click **Start all** to simultaneously start this stream and any other streams you have configured for this channel.
11. Click **Delete this stream** at any time to delete the stream.

Set up an SRT stream using rendezvous mode

Secure Reliable Transport (SRT) is an open-source streaming protocol that offers quality, low latency streaming to CDNs and other SRT enabled decoders across unreliable Internet connections via UDP.

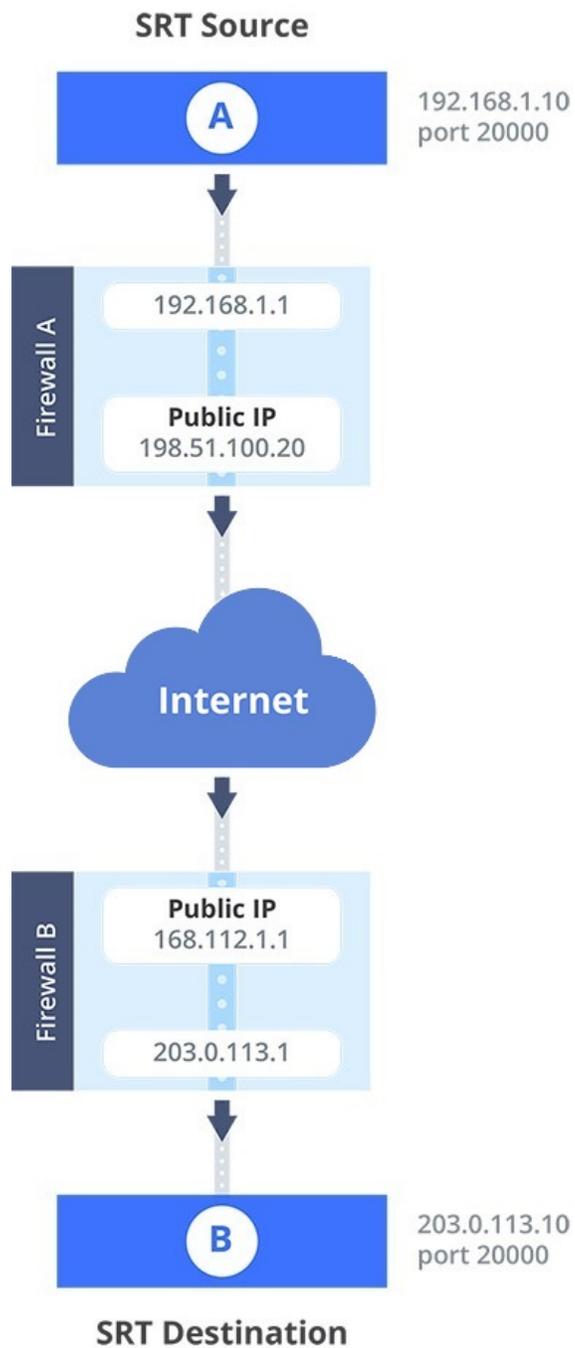
The easiest way to establish a link between the SRT source and destination devices is to use rendezvous mode. In rendezvous mode, both the SRT source and destination device are ready to establish the SRT connection as soon as an SRT stream starts.



Typically, no intervention is needed from your IT administrator to traverse a firewall in rendezvous mode. However, you can switch to SRT caller and listener modes if you experience difficulties streaming through a firewall in rendezvous mode, see [Set up an SRT stream using caller and listener modes](#).

To establish the SRT connection between the source and destination devices in rendezvous mode, both devices must be configured and ready to establish the connection between them. Each must know the IP address of the other device and both must be configured to use the same port for the SRT stream.

In the following example, a Pearl Nano is set up as SRT Source A (192.168.1.10) with port 20000 and another Pearl Nano is set up as SRT Destination B (203.0.113.10) with port 20000.



Source A streams through Firewall A and Firewall B to Destination B, which ingests the SRT stream as a video input with embedded audio. All traffic received at Firewall B that's addressed to 168.112.1.1 on port 20000 passes through the firewall directly to Destination B (203.0.113.10) because of the port number.

What's needed for this setup

- The public IP address of Source A (e.g. 198.51.100.20) and the public IP address of Destination B (e.g. 168.0.113.10).
- The SRT streaming port that Source A is configured to use (e.g. port 20000).
- Configure SRT Destination B to use the same port value as Source A for the SRT stream (e.g. 20000). If the destination device is another Pearl Nano, you do this when adding the SRT stream as a video input source using the Admin panel, see [Connect an SRT stream as an input](#).

When you're configuring an SRT stream on Pearl Nano, you can also adjust the recovery bandwidth overhead using the Admin panel. This setting defines how much of the stream's total bandwidth is dedicated for the exchange of SRT control and recovery packets between the source and destination. Ensure that the total SRT stream bitrate (i.e. the bandwidth required for the stream plus the recovery bandwidth overhead) is less than the network bandwidth you have available.

Set up Pearl Nano as a streaming source in rendezvous mode using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Streaming**. The Streaming configuration page opens.
3. Click **New stream** and choose **SRT push**. The new stream with the default name *Stream 1* is created.
4. Click the stream name to expand the stream settings.
5. In the **Connection mode** field, select **Rendezvous**.
6. Enter the **URL** of the SRT destination (decoder) using the format `srt://<decoder-ip-address>:<port>`, where the `<decoder-ip-address>` and `<port>` values are provided by the CDN, media server, or an SRT decoder device such as a second Pearl Nano at the destination.
7. (Optional) Check Encryption and choose the AES key length if the SRT destination requires AES encryption. These settings must match the encryption settings of the destination device, see [Set AES encryption and a passphrase for SRT](#).
8. (Optional) If the SRT destination has a required security **Passphrase** along with the AES encryption, you can enter that here.
9. (Optional) In the **Latency** field adjust the amount of latency to apply to the stream. The default value is 125 ms.

 We recommend using the default latency and recovery bandwidth overhead values for an initial test stream. After you perform a test stream, you can determine the Quality of Service (QoS) and calculate the latency requirements. To set the SRT stream latency, see [Adjust latency and view the SRT stream status](#).

10. (Optional) In the **Recovery bandwidth overhead** field, adjust the % value of the bandwidth that's dedicate for SRT control and recovery packets. The default value is 25%.
11. (Optional) Rename the stream. Click the current name and enter a different name, then press **Enter**.

 Refresh your browser if the new stream name doesn't immediately display.

12. Click **Apply**.
13. When your ready to start streaming, click **Start**

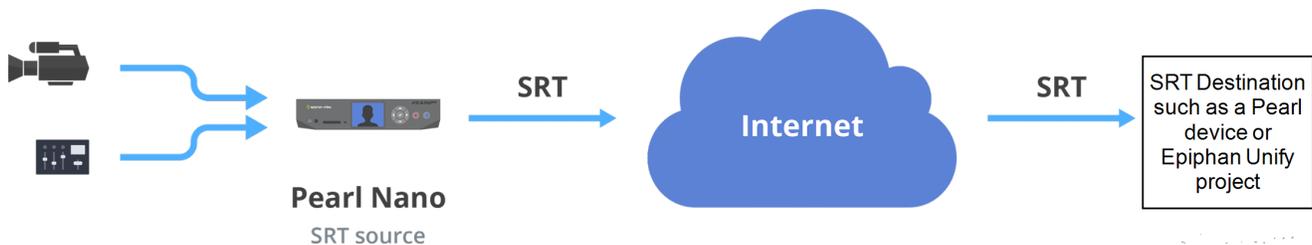
What's next?

If you also need to set up Pearl Nano as an SRT destination and ingest an SRT stream from a remote source, you must add the SRT stream as a input, see [Connect an SRT stream as an input](#).

Set up an SRT stream using caller and listener modes

When setting up SRT streaming on Pearl Nano, you can configure Pearl Nano as an SRT source encoder and send an SRT stream over the Internet to other SRT destinations (decoders) such as a CDN or another Pearl Nano.

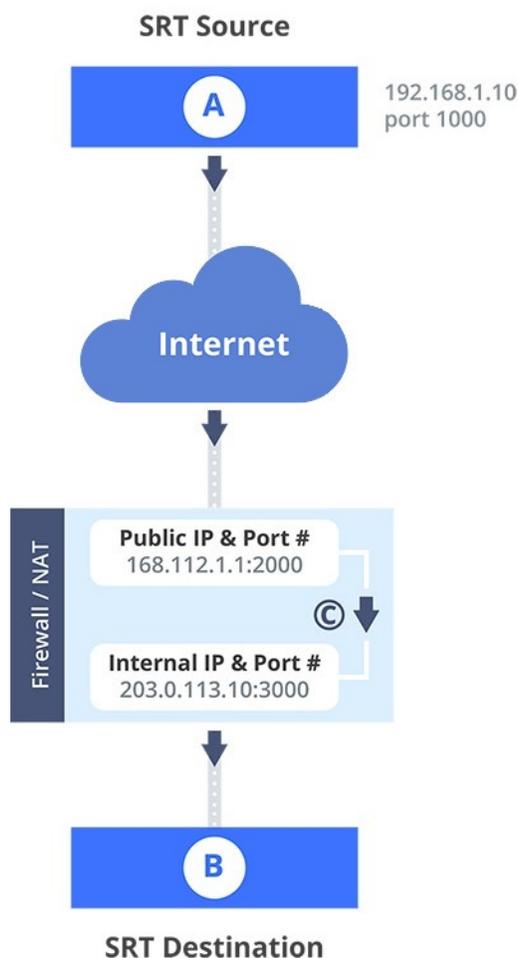
Caller and listener modes work together to establish the SRT link between your SRT source and destination device when traversing the firewall is difficult and Rendezvous mode didn't work.



To establish an SRT link between the source and destination devices, ensure that one device is a Listener and the other is a caller. The device you set as the caller (or listener) is arbitrary. If the destination device

is set as the listener and is ingesting multiple SRT sources, then all your SRT source devices must be set as callers.

In the following example, Pearl Nano is set up as SRT Source A (192.168.1.10) and another Pearl Nano is set up as SRT Destination B (203.0.113.10). Source A is streaming through a firewall/NAT to Destination B, which ingests the SRT stream as a video input with embedded audio.



The public IP address of the Firewall/NAT is 168.112.1.1 and port 2000 is the designated SRT streaming port. All traffic received at 168.112.1.1 on port 2000 is granted permission to pass through the firewall and is forwarded (C) to Destination B's internal IP address (203.0.113.10) on port 3000.

What's needed for this setup

- The internal IP address of SRT Destination B (e.g. 203.0.113.10).
- The SRT port value that was configured on SRT Destination B using the Admin panel when the SRT stream was added as a video input source using the Admin panel (e.g. port 3000).

- The public IP address of the firewall. An easy way to get the public IP address is to use a web browser and do a Google search for "**What is my IP address**" (e.g. 168.112.1.1).
- The IT administrator in charge of the firewall must open a port for the SRT stream (e.g. port 2000). The port must allow 2-way traffic and route the traffic to the internal IP address and SRT port of Destination B. In this example, traffic received at the firewall's public IP address 168.112.1.1 on SRT port 2000 is routed to 203.0.113.10:3000.

When you're configuring an SRT stream on Pearl Nano, you can also adjust the recovery bandwidth overhead using the Admin panel. This setting defines how much of the stream's total bandwidth is dedicated for the exchange of SRT control and recovery packets between the source and destination. Ensure that the total SRT stream bitrate (i.e. the bandwidth required for the stream plus the recovery bandwidth overhead) is less than the network bandwidth you have available.

Set up Pearl Nano as a streaming source in caller/listener mode using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Streaming**. The Streaming configuration page opens.
3. Click **New stream** and choose **SRT push**. The new stream with the default name *Stream 1* is created.
4. Click the stream name to see the stream settings.
5. In the **Connection mode** field, select if this Pearl Nano is the caller or a listener.
 - a. If **Caller** is selected, do the following:
 - i. In the **URL** field, enter the IP address of the SRT destination (decoder) using the format *srt://<decoder-ip-address>:<port>*, where the *<decoder-ip-address>* and *<port>* could be provided by the CDN, media server, or another SRT decoder device.
 - ii. (Optional) In the **Source port** field, enter the port number that this Pearl Nano should use for SRT traffic.
 - b. If **Listener** is selected, enter the **Port** number that this Pearl Nano should use for SRT traffic. See [Network ports used by Pearl Nano](#) to determine available ports.
6. (Optional) In the **Stream ID** field, enter a unique name for this stream.
7. (Optional) Check Encryption and choose the AES key length if the SRT destination requires AES encryption. These settings must match the encryption settings of the destination device, see [Set AES encryption and a passphrase for SRT](#).
8. (Optional) If the SRT destination has a required security **Passphrase** along with the AES encryption, you can enter that here.

- (Optional) In the **Latency** field adjust the amount of latency to apply to the stream. The default value is 125 ms.



We recommend using the default latency and recovery bandwidth overhead values for an initial test stream. After you perform a test stream, you can determine the Quality of Service (QoS) and calculate the latency requirements. To set the SRT stream latency, see [Adjust latency and view the SRT stream status](#).

- (Optional) In the **Recovery bandwidth overhead** field, adjust the % value of the bandwidth that's dedicated for SRT control and recovery packets. The default value is 25%.
- (Optional) Rename the stream. Click the current name and enter a different name, then press **Enter**.



Refresh your browser if the new stream name doesn't immediately display.

- Click **Apply**.
- When your ready to start streaming, click **Start**

What's next?

If you also need to set up Pearl Nano as an SRT destination and ingest an SRT stream from a remote source, you must add the SRT stream as a input, see [Connect an SRT stream as an input](#).

Adjust latency and view the SRT stream status

Secure Reliable Transport (SRT) achieves high-quality, low-latency streaming across unreliable Internet connections via UDP packets. If packets are lost in transit to the SRT destination, a request to retransmit the lost packets is sent back to Pearl Nano. Using the Admin panel, you can adjust the latency to improve the Quality of Service (QoS) of the stream and reduce the number of dropped packets.

During the SRT stream, you can view the stream statistics using the Admin panel and adjust the amount of latency based on the packet loss % and Round Trip Time (RTT). SRT stream statistics are provided on the streaming configuration page for a channel when Pearl Nano is configured as an SRT source. If Pearl Nano is configured as an SRT destination with an SRT input, then SRT statistics are available on the SRT input configuration page.

The following example shows SRT statistics for an SRT stream. The statistics section appears only while an SRT stream is active. It takes about 30 seconds for the statistics to appear after the SRT connection is established.

▼ SRT to 10.2.5.25
1:12:05
Stop

Type: SRT push
IP: 10.2.5.25

Delete this stream

Statistics ^

Round Trip Time	.576ms	Packet loss %	0.00
Latency	125ms	Total re-sent packets	0
Send rate	2.968 Mbps	Total packets sent/lost	1246009/0
Reconnections	0	Buffer	1ms

Single touch control

Connection mode: Caller ▼

URL:

Source port:

Stream ID:

Encryption

Key length: AES-128 ▼

Passphrase:

Latency: ms

Recovery bandwidth overhead: %

Apply

You can add from 80 ms to 8000 ms of latency to the SRT stream. Increasing latency gives more time to buffer packets and resend any that got lost in transit to the destination. If the latency value set for the stream is too low and there is packet loss over the network, retransmission of lost packets will not be possible and the stream quality will suffer.

Latency can be configured at the source and at the destination. SRT uses the highest of the two latency values.

The formula to calculate latency is:

$$SRT\ Latency = RTT\ Multiplier \times RTT$$

where the recommended range of the *RTT Multiplier* is a value from 3 to 20.

The following table provides guidelines for what values to use when calculating latency. An RTT multiplier value less than 3 is too small for SRT to be effective and a value above 20 indicates a network with 100% packet loss. Ensure the measured **buffer** is less than or equal to the latency value you use.

Table 53 Suggested SRT latency values

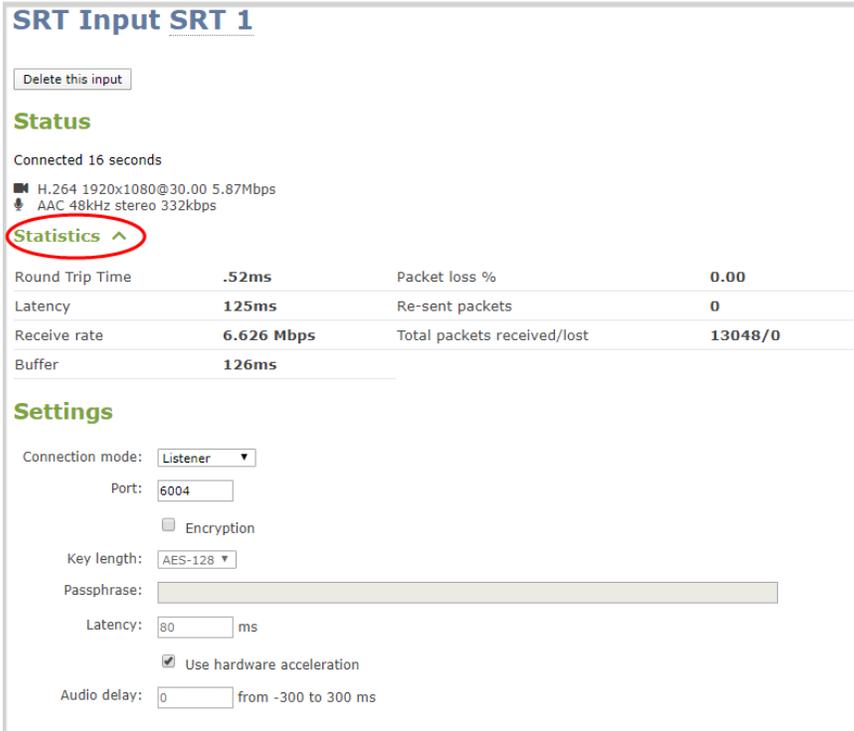
Packet loss %	RTT multiplier	Recovery bandwidth overhead	Minimum SRT latency (for RTT ≤ 20 ms)
% is ≤ 1	3	33	60
% is ≤ 3	4	25	80
% is ≤ 7	5	20	100
% is ≤ 10	6	17	120

These values are from the SRT Deployment Guide. For up-to-date calculations, visit www.srtalliance.org.

For example, if the % of packet loss is 0.53 and the measured RTT is 16.506 ms, the latency calculation is: $49.518 = 3 \times 16.506$ ms or 50 ms of latency (rounded up).

Adjust latency and recovery bandwidth overhead for an SRT stream using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. View the SRT statistics for the active stream. Do one of the following:
 - a. To open the SRT statistics from the **Channel(s)** menu, select the channel with the SRT stream to configure and click **Streaming**. The Streaming configuration page opens. Then select the arrow beside the SRT stream to reveal the SRT stream statistics.
 - b. To open the SRT statistics from the Inputs menu, select the SRT input. Then on the SRT input configuration page, select the arrow beside Statistics.



SRT Input SRT 1

Delete this input

Status

Connected 16 seconds

H.264 1920x1080@30.00 5.87Mbps
AAC 48kHz stereo 332kbps

Statistics ^

Round Trip Time	.52ms	Packet loss %	0.00
Latency	125ms	Re-sent packets	0
Receive rate	6.626 Mbps	Total packets received/lost	13048/0
Buffer	126ms		

Settings

Connection mode: Listener

Port: 6004

Encryption

Key length: AES-128

Passphrase:

Latency: 80 ms

Use hardware acceleration

Audio delay: 0 from -300 to 300 ms



The statistics section only appears while an SRT stream is active.

3. In the **Latency** field, enter a numerical value from 80 ms to 8000 ms.
4. Click **Apply**.

We recommend testing your settings. Start the SRT stream and use the stream statistics to evaluate the effect the latency and recovery bandwidth overhead values have on the packet loss % of the stream.

Set AES encryption and a passphrase for SRT

You can configure your Secure Reliable Transport (SRT) streams to use 128 bits, 192 bits, or 256 bits AES encryption using the Admin panel. You can also assign the SRT stream an alphanumeric passphrase if required. The encryption and passphrase settings on the SRT encoder sending the stream must match the settings on the SRT decoder receiving the stream.

The encryption key length is negotiated between the source and destination devices. The key length of the sender is used to determine the key length that is eventually used to secure the connection, and the receiver obtains the key length from the sender. As long as the passphrases match, the key length will be negotiated.

Set up AES encryption and a passphrase for an SRT stream using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel with the SRT stream to configure and click **Streaming**. The Streaming configuration page opens.
3. Click the arrowhead beside the SRT stream name to reveal the stream settings. In this example, the name of the SRT stream is Stream 1.
4. Check Encryption and choose the **Key length**.
5. In the **Passphrase** field, enter the passphrase using alphanumeric characters (if required). The password must be a minimum of 10 characters and maximum of 79 characters.
6. Click **Apply**.

Set up AES encryption and a passphrase for an SRT input using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Inputs menu, select the SRT input you want to configure. The SRT input configuration page opens.
3. Check Encryption and choose the **Key length**.
4. In the **Passphrase** field, enter the passphrase using alphanumeric characters (if required). Special characters are not supported.
5. Click **Apply**.

Set up an HLS (push) stream

HTTP Live Streaming (HLS) is an adaptive, HTTP-based streaming protocol that sends video and audio content over the network in small, media segments that get reassembled at the streaming destination. Media segments stream over HTTP port 80 or port 443 for HTTPS, which are typically open for network access. As such, the content can easily traverse firewalls with little to no IT involvement.

Pearl Nano can send a single resolution and bitrate HLS stream as an HTTP POST (or HTTP PUT) to HLS ingestion servers and CDNs such as Akamai and YouTube. The default is HTTP POST. Your channels on Pearl Nano must be configured for H.264 or preferably H.265 on Pearl Nano and AAC audio codec to stream using HLS. Pearl Nano supports MD5, SHA-256, and SHA-512 hashing algorithms to authenticate the stream.

HLS uses an MPEG2-TS transport stream container with a configurable media segment duration, as well as a configurable playlist size for reassembling the media segments at the ingestion server. Because HLS favors Quality of Service (QoS) over low-latency, lag times that can be high. If a specific media segment size isn't required by the ingestion server, then you can shorten the duration of the media segment to decrease latency. The default segment duration is six seconds.

Using the Admin panel, you can add advanced features like a master manifest, which is an address applied to each individual media playlist in the stream. You can also assign the HLS stream a user name and password. If security and authentication credentials are required to stream to the ingestion server, consult the ingestion server provider.

Important considerations

- Only a single resolution and bitrate stream is supported.
- See [Suggested stream settings](#) for the best streaming settings for Pearl Nano.
- Fragmented MP4 is not supported.
- If the HLS ingestion server requires a custom user-agent name, add that to the HLS stream in the Advanced settings using the Admin panel and ensure the agent-name is added to the HLS ingestion server's white list. Contact the IT administrator responsible for the ingestion server.
- If the HLS ingestion server requires a user name and password, you can get those credentials from the IT administrator responsible for the ingestion server.

Set up an HLS (push) stream using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Streaming**. The Streaming configuration page opens.

3. Click **New stream** and choose **HLS push**. The new stream is created using the default name *Stream 1*. To see the settings, click the stream name.
4. In the **Media Playlist URL field**, enter the URL of the destination server that is ingesting the stream. For example: `http://p-ep721023.i.akamaientrypoint.net/722223/hlsQualification/my_video.m3u8`
5. (Optional) In the **Segment template** field, enter the naming format used for the names of media segments. For example: `chunk-Number%05d$.ts`
6. (Optional) Enter a **Username** and **Password** if required for this stream. Get this from the ingestion server provider.
7. In the **Method** field, select **POST** or **PUT**. This selection must match the requirements of the ingestion server.
8. In the **Segment duration** field, enter the length of the media segment in seconds. The default duration is six seconds. Fractions and periods are not supported.
9. In the **Playlist size** field, enter the number of .ts segment files in each segment. The default playlist size is six.
10. (Optional) Under **Advanced settings**, you can set the following:
 - a. **Master manifest**: Enter the URL (including the master playlist file name) of where Pearl Nano will upload the master manifest file. The master playlist also provides the bitrate, resolution, and codec.
 - b. **User-agent**: Enter a user-agent name using alphanumeric characters only if the ingestion server requires a specific value in the user-agent header to allow the incoming stream from this device.
11. Click **Apply**.
12. When you're ready to start streaming this channel, click **Start**.

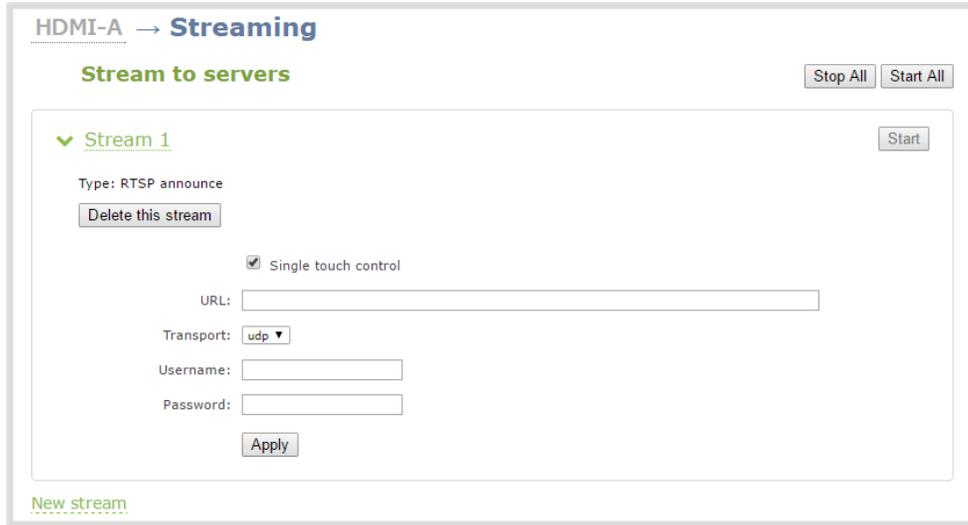
Set up an RTSP announce stream

Pearl can stream using RTSP announce. Viewers can copy and paste the URL of the RTSP stream into a media player and watch the stream on their local network. For more information about using RTSP streaming, see [Share a live broadcast stream \(HTTP, HTTPS, or RTSP\)](#).

Setup an RTSP announce stream using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Streaming**. The Streaming configuration page opens.

3. Click **New stream** and choose **RTSP announce**. The new stream is created using the default name Stream 1.



The screenshot shows a web interface for configuring a stream. At the top, it says 'HDMI-A → Streaming' and 'Stream to servers'. There are 'Stop All' and 'Start All' buttons. Below, a section for 'Stream 1' is expanded, showing a 'Start' button. The stream type is 'RTSP announce' with a 'Delete this stream' button. A 'Single touch control' checkbox is checked. There are input fields for 'URL:', 'Transport:' (set to 'udp'), 'Username:', and 'Password:'. An 'Apply' button is at the bottom. A 'New stream' link is visible at the bottom left of the form area.

4. Click the stream name to see the stream settings.
5. (Optional) To rename the stream, click the current name and type a different name, then press **Enter**.



Refresh your browser if the new stream name doesn't immediately display.

6. Enter the following parameters:
 - The **URL** of the ingestion point provided by the CDN or media server.
 - Select the **Transport type** as either UDP or TCP. Consult your CDN provider to find out which transport protocols the CDN supports.
 - The CDN **User name** and **Password** (if required).



The CDN provider assigns a user name and password to authenticate the publisher. Contact the CDN provider for your log in credentials.

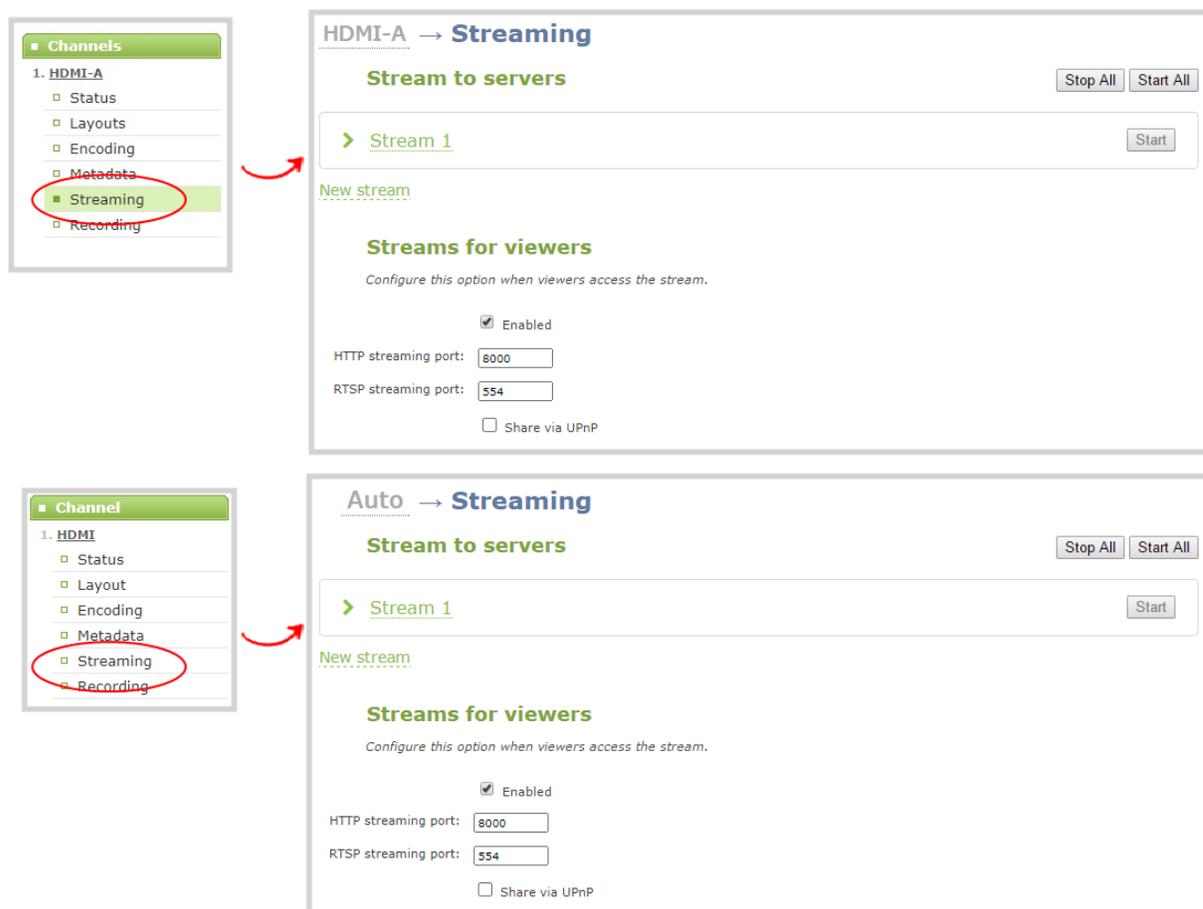
7. Click **Apply**.
8. To start streaming, click **Start** or click **Start all** to simultaneously start this stream and any other streams you have configured for this channel.
9. Click **Delete this stream** at any time to delete the stream.

Set up a stream to the CDN using an XML profile

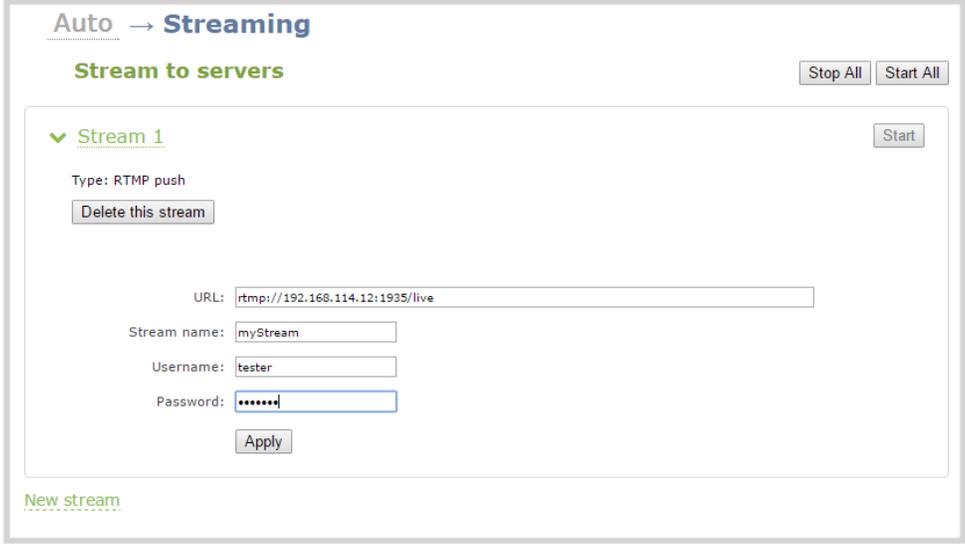
Some CDNs provide an XML file for easy configuration setup. Pearl Nano supports using XML profiles to set a stream.

Set up a stream using an XML profile from the CDN

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channel menu, select the channel and click **Streaming**. The Streaming configuration page opens.



3. Click **New stream** and select **Use profile XML**.
4. Select the XML file that was provided by your CDN provider, then click **OK**. The new stream is created using the default name Stream 1 and the configuration from the XML file is applied.



5. Click **Apply**.
6. To start streaming, click **Start** or click **Start all** to simultaneously start this stream and any other streams you have configured for this channel.
7. Click **Delete this stream** at any time to delete the stream.

Start and stop streaming to a CDN

After your stream to a CDN is configured on the channel, you can start and stop streaming.

Start and stop your stream using:

- the admin panel
- Epiphan Edge
- the front screen streaming button or the front screen menu. When you use the front screen menu, you can also modify the URL of a chosen stream.

Start and stop streaming using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select a channel and click **Streaming**. The Streaming configuration page opens.



To set up a stream using the Admin panel, click **New stream** and follow the instructions for how to **Streaming to a CDN, multicasting, and streaming to multiple destinations**.

3. Click **Start** at the top right corner to start that stream, or click **Start all** at the top of the page to start streaming all streams that are configured for the channel.
4. Click **Stop** at the top right corner to stop that stream, or click **Stop all** at the top of the page to stop streaming for all streams that are configured for the channel.

Start and stop streaming using the front screen menu

1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.
2. Use the arrow and check mark keys to select **Channel**. Then from the Channel screen, select **Streaming** to open the Streaming screen with the list of streams already configured for the channel.
3. Use the arrow and check mark keys to select a stream and open the stream's details screen.
4. From the stream's details screen, use the arrow keys to highlight **Start** and press the **check mark** key start streaming. When you're done, highlight **Stop** and press the **check mark** key to stop streaming.



Before you start the stream, you can select **Destination url** using the check mark key and modify the stream destination's URL.

Start and stop streaming using the Stream control key on the front panel

Simply press the **Stream control key** on Pearl Nano's front panel to easily start and stop streaming a channel.

The Stream control key glows solid blue and the streaming timer on the Channel view increments while streaming is in progress. When you're done, press the Record control key again to stop streaming. If multiple streams are configured for the channel, pressing the Stream control key starts and stops all streams at the same time. For more information, see [Record and stream using the control keys](#).



Multicast streaming

You can add multiple multicast streams to a channel in Pearl Nano. A multicast stream consists of one stream distributed to many viewers via a multicast-capable network. You can stream to several multicast networks and at the same time, stream to non-multicast CDNs.

Pearl Nano supports multicast streaming to an IP TV or a set-top box playlist using SAP when the stream format is MPEG-TS.

Topics include:

- [MPEG-TS streams using RTP/UDP push](#)
- [MPEG-TS streams using UDP push](#)
- [Multicast streaming using RTP/UDP](#)
- [Set up traffic shaping](#)
- [Viewing with Session Announcement Protocol \(SAP\)](#)

MPEG-TS streams using RTP/UDP push

When you configure an MPEG-TS stream using RTP/UDP push, you have the option to enable SAP and multicast over a local network at the same time.

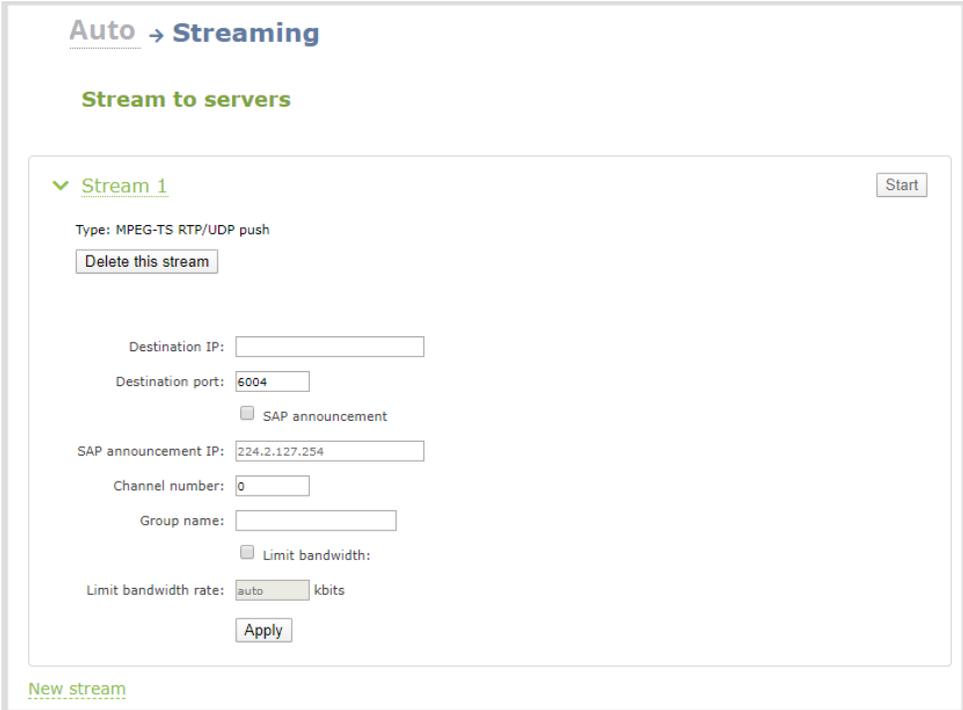
Before configuring your channel for MPEG-TS streaming, ensure the following codecs are configured:

- Video – H.264
- Audio – MP3 or AAC, if audio is configured.

If you're streaming to 10/100 Mbps set-top boxes over Gigabit Ethernet and you notice frames are dropping, you can limit the bandwidth of the stream, see [Set up traffic shaping](#).

Configure a channel for MPEG-TS using RTP/UDP push and enable SAP

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Channel menu, select the channel and click **Streaming**. The Streaming configuration page opens.
3. Click **New stream** and select **MPEG-TS RTP/UDP push**.



The screenshot shows the 'Auto → Streaming' configuration page. Under the heading 'Stream to servers', there is a section for 'Stream 1' with a 'Start' button. The configuration details are as follows:

- Type: MPEG-TS RTP/UDP push
- Buttons: Delete this stream
- Destination IP: []
- Destination port: 6004
- SAP announcement
- SAP announcement IP: 224.2.127.254
- Channel number: 0
- Group name: []
- Limit bandwidth:
- Limit bandwidth rate: auto kbits
- Buttons: Apply

At the bottom left of the configuration area, there is a link for 'New stream'.

4. Enter the destination multicast IP address where the broadcast can be viewed.



A IPv4 multicast address range is an address between 224.0.0.0 to 239.255.255.255. Contact your System Administrator for the specific address to use.

5. Enter the destination port number through which the media will stream.
6. (Optional) To advertise your stream to a media player over a local network, do the following:
 - a. Check **SAP announcement** to enable advertising your stream over a local network. When this is enabled and a multicast IP address is configured, your stream is displayed in the playlist of the local media player.
 - b. Enter a multicast IP address in the **SAP announcement IP** field. If your media player is configured to receive multicast streams from an IP address that is different from the default address 224.2.127.254, you may need to contact your system administrator for a specific multicast IP address.
 - c. Enter a channel number in the **Channel number** field to identify your stream in the media player. By default, the Channel number is the channel identifier.



When a channel number value is not specified, viewers cannot select a channel from the set-top box or Smart TV .

- d. Enter a name for a group of streams in the text box next to **Group name**. Since media players simply present a list of available streams, you can organize your streams into multiple folders or in cases where folders are not displayed, use dot separator hierarchy to help your viewers filter out unwanted streams by category.
7. Click **Apply**.
8. Select **Start** when you're ready to start streaming.
9. Select the **Info** menu to see the stream information.

View the MPEG-TS RTP/UDP stream

To view the stream from a media player, open the URL in the 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

When you configure an MPEG-TS stream using UDP push, you have the option to enable SAP and multicast over a local network at the same time.

Before configuring your channel for MPEG-TS streaming, ensure the following codecs are configured in the encoding section:

- Video – H.264 or H.265 for Pearl Nano
- Audio – MP3 or AAC, if audio is configured.

To configure MPEG-TS with UDP push and enable SAP:

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Streaming**. The Streaming configuration page opens.
3. Click **New stream** and select **MPEG-TS UDP push**.
4. Enter the destination multicast IP address where the broadcast can be viewed.



A IPv4 multicast address range is an address between 224.0.0.0 to 239.255.255.255. Contact your System Administrator for the specific address to use.

5. Enter the destination port number through which the media will stream.
6. (Optional) To advertise your stream to a media player over a local network, do the following:
 - a. Check **SAP announcement** to enable advertising your stream over a local network. When this is enabled and a multicast IP address is configured, your stream is displayed in the playlist of the local media player.
 - b. Enter a multicast IP address in the **SAP announcement IP** field. If your media player is configured to receive multicast streams from an IP address that is different from the default address 224.2.127.254, you may need to contact your system administrator for a specific multicast IP address.
 - c. Enter a channel number in the **Channel number** field to identify your stream in the media player. By default, the Channel number is the channel identifier.

 When a channel number value is not specified, viewers cannot select a channel from the set-top box or Smart TV .
 - d. Enter a name for a group of streams in the text box next to **Group name**. Since media players simply present a list of available streams, you can organize your streams into multiple folders or in cases where folders are not displayed, use dot separator hierarchy to help your viewers filter out unwanted streams by category.
7. Click **Apply**.
8. Select **Start** when you're ready to start streaming.

View the MPEG-TS UDP stream

To view the stream from a media player, open the URL in the 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 \(SAP\)](#).

If you're streaming to 10/100 Mbps set-top boxes over Gigabit Ethernet and you notice frames are dropping, you can limit the bandwidth of the stream, see [Set up traffic shaping](#).

Multicast streaming using RTP/UDP

You configure an RTP/UDP (push) stream on Pearl Nano using the Admin panel.

If you're streaming to 10/100 Mbps set-top boxes over Gigabit Ethernet and you notice frames are dropping, you can limit the bandwidth of the stream, see [Set up traffic shaping](#).

Configure a channel to stream using RTP/UDP push

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Streaming**. The Streaming configuration page opens.
3. Click **New stream** and select **RTP/UDP push**.
4. Enter the following:
 - Destination multicast IP address.
 - Audio port number through which the audio will stream.
 - Video port number through which the video will stream.



Audio and video use nearby port numbers (<port number>and <port number+2>). The minimum distance between audio and video ports must be 2.

5. Click **Apply**. An SDP file is generated.
6. From the channel's **Status** page, click the SDP file to download it. Provide the SDP file name and location if prompted.
7. Share the file with your viewers and when you're ready to start streaming, select **Start**.

Set up traffic shaping

If you're multicasting to set-top boxes that have 10/100 Mbps interfaces on the same Gigabit Ethernet and you notice frames are dropping, you can limit the bandwidth of the stream using traffic shaping to adapt for the lower bandwidth set-top boxes. Only multicast streams support traffic shaping: MPEG-TS USP, MPEG-TS RTP/UDP, and RTP/UDP.



If traffic shaping was previously setup using the API, we recommend switching to this method of setting traffic shaping using the Admin panel. If traffic shaping is currently setup using Pearl Nano's API, see the Technical Notes for your Pearl Nano model for instructions. They're available from the product resources page on the [Epiphany.com](https://www.epiphany.com) website.

When traffic shaping is enabled, the default bitrate limit is set to auto. In auto mode, the bitrate is limited to the sum of the channel's configured bitrate plus 4 Mbps and is adjusted to fit within the range of 4 Mbps minimum to 95 Mbps maximum.

You can also set a bitrate limit for the maximum amount of bandwidth that gets streamed using the Admin panel when traffic shaping is enabled. When you do, the streamed video won't exceed the maximum bitrate you set. The valid bandwidth limit bitrate range is 4 Mbps to 95 Mbps. We recommend that you set the bitrate to a value no less than the channel encoding bitrate plus 4 Mbps.

For example, if the bitrate for the channel is set to 10 Mbps in the encoding settings, the minimum value we recommend for the bandwidth limit bitrate is 14 Mbps.

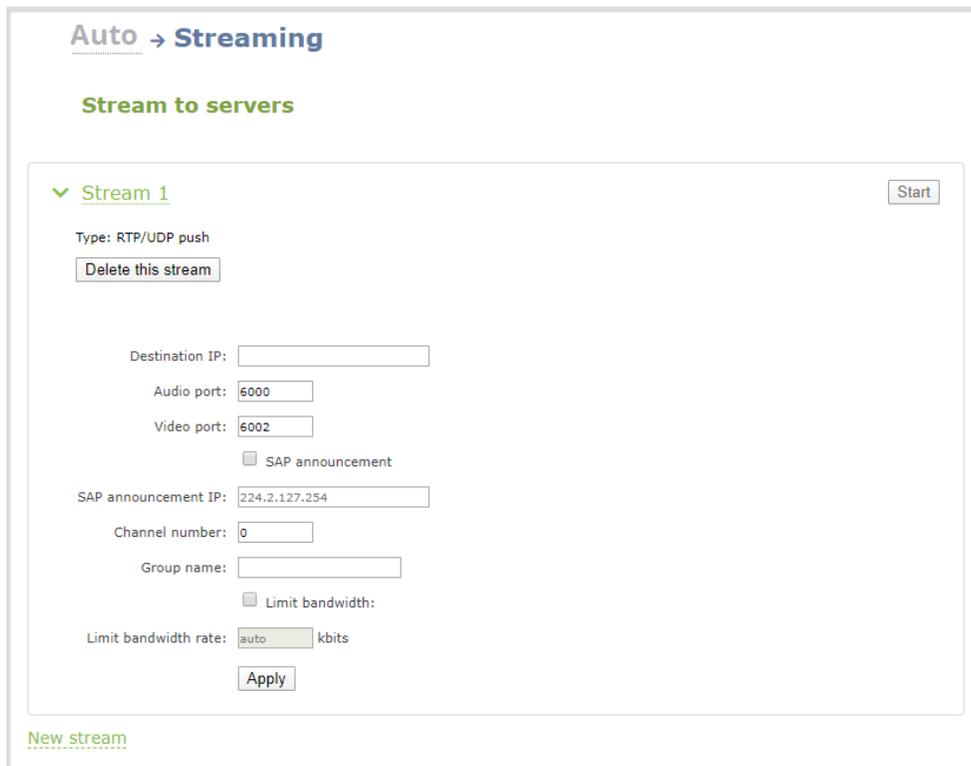
Important considerations

- Traffic shaping works for the local switch. Switches connected to the local switch don't respect the policy.
- If the channel encoding bitrate is set to a value that's less than 4 Mbps and traffic shaping is enabled, the minimum bandwidth limit does not drop below than 4 Mbps.
- If the channel encoding bitrate value is greater than 95 Mbps and traffic shaping is enabled, the maximum bandwidth limit does not exceed 95 Mbps.
- If the bandwidth limit is set to auto and the total of the channel bitrate plus 4 Mbps exceeds 95 Mbps, the maximum bandwidth limit does not exceed 95 Mbps.
- After enabling traffic shaping for a channel using the Admin panel, you can no longer use the Pearl Nano API to clear or configure traffic shaping for that channel. If you currently use the API to configure traffic shaping, see the Technical Notes for your Pearl Nano model for instructions. They're available from the product resources page on the [Epiphan.com](https://www.epiphan.com) website.

After traffic shaping is enabled, we recommend that you first test a multicast stream using the auto traffic shaping settings. If your low bandwidth network device is displaying poor video quality, then go ahead and manually set the limit bandwidth bitrate according to the bandwidth of your particular network device.

Set traffic shaping for a multicast stream using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Streaming**. The Streaming configuration page opens.
3. Click **New stream** and select a multicasting stream as the type: **MPEG-TS USP**, **MPEG-TS RTP/UDP**, or **RTP/UDP**. The new stream is created with the default name *Stream 1*.
4. Click the stream name to see the stream settings.



Auto → Streaming

Stream to servers

▼ **Stream 1** Start

Type: RTP/UDP push

Delete this stream

Destination IP:

Audio port:

Video port:

SAP announcement

SAP announcement IP:

Channel number:

Group name:

Limit bandwidth:

Limit bandwidth rate: kbits

Apply

[New stream](#)

5. Check **Limit bandwidth**. The default bitrate is set to **auto**.
6. (Optional) Set the **Limit bandwidth rate** and enter a bitrate value from 4,000 kbps to 95,000 kbps.
7. Click **Apply**.

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 [Multicast streaming](#).

Your stream is advertised by the metadata title, if one was configured; otherwise, the stream is identified by its channel identifier. For Pearl Nano, the channel identifier is always 1. For a description of how to set the metadata, refer to [Add or remove channel metadata](#).

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

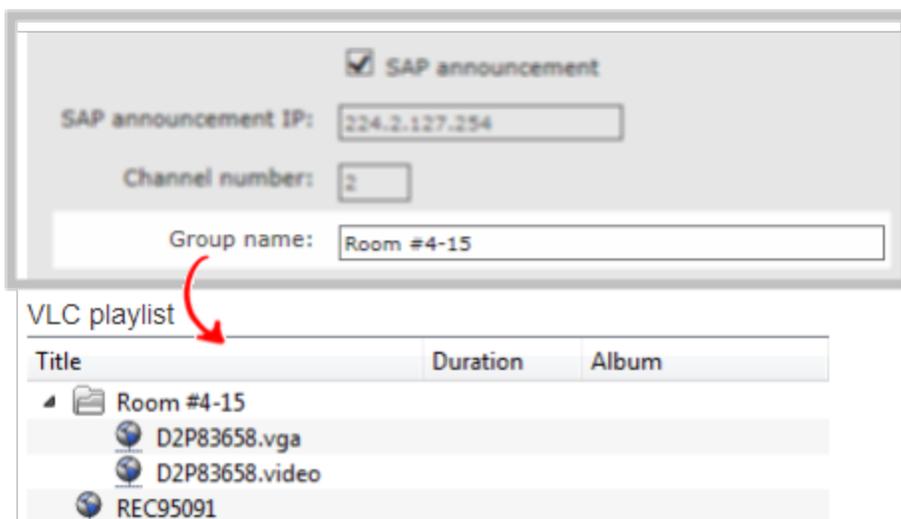
View the Session Announcement Protocol (SAP) stream

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.

3. Launch a media player and play the streams.
 - a. Using VLC, click **View** and select Playlist. The right-hand panel indicates the playlist is empty.
 - b. From the side menu, click **Network streams (SAP)**. The playlist is populated with all streams in your network that are SAP announcement enabled. If you specified a Group Name when you configured the publish stream the stream will be listed in folder identified by the group name.
 - c. Click on a live stream in the playlist to play the stream.

This VLC example shows two streams D2P83658.vga and D2P83658.video, which are organized in a folder by their group name.



Streaming to a media player or smart TV

Your Pearl Nano can use SAP to stream to set-top boxes, digital signs, smart TVs and other digital media players.

The following table gives an overview of how this works.

Publishing Options	Use this option to...
SAP	<p>SAP (session announcement protocol) is a protocol for broadcasting multicast session information. You can enable SAP and stream over a local network when MPEG-TS multicast streaming is configured, see Multicast streaming.</p> <p>Media players can see the announcement or can use the multicast SDP file (session description file) directly, see Viewing with Session Announcement Protocol (SAP).</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.



Record

You can stream your content and record it at the same time. Pearl Nano encodes the video and audio it captures.

There are different ways to download recordings, like automatically downloading recordings to a USB memory device. For Pearl Nano, an SD card or a SATA M.2 2280 SSD must be installed to record content, see: [SD card and SATA M.2 2280 SSD storage](#).

Topics include:

- [About recording](#)
- [Record a channel](#)
- [Configure recording settings, file size, and type](#)
- [Restart recording to a new file](#)
- [Manage recorded files](#)
- [Automatic file transfers](#)

For instructions on how to use Pearl Nano's front screen to start/stop scheduled recordings for a CMS event, see: [Stop/start scheduled CMS events using Pearl Nano's front screen menu](#).

For information about recording with a Content Management System (CMS), see: [CMS recording and webcasting control](#).

About recording

You can record a channel on Pearl Nano as AVI, MOV, MPEG-TS, MP4, or MP4-Fragmented. Easily stop and start recording using any of the following:

Epiphan product	Admin panel	Device screen	Epiphan Edge	Epiphan Live
Pearl Nano	Yes	Yes (Use front panel control keys)	Yes	No

If an accidental system shutdown occurs while recording is in progress, your recordings are closed off so they are still playable. Physically unplugging a video source from the input port or otherwise interrupting the signal does not stop recording. A No Signal image is inserted.

Pearl Nano also comes with APIs so you can set up third party tools to control recording. For information on the current REST API, see: [Pearl System REST API Guide](#). For information on the Legacy APIs, see: [Pearl System Legacy RS-232/HTTP API Guide](#).

If PoE+ power is interrupted while Pearl Nano is actively recording, the recorded file could become corrupted and be unplayable.

You can set the maximum recording time or file size limit using the Admin panel. The default recording limits are set to 30 minutes or 500 MB, whichever comes first. When the time or file size limit is reached, the current recording is saved and a new recording file starts automatically without losing any content. When the local drive is full, newer recordings overwrite oldest recordings.

Important considerations

- If recordings are selected for Automatic File Upload (AFU) while AFU is at maximum upload capacity or when AFU is unavailable, the recordings are added to an upload queue. If there is no available space left in the storage medium, new recordings fail and do not overwrite recordings in the AFU queue.
- For information about recording to Content Management Systems (CMSs) like Kaltura and Panopto, see [CMS recording and webcasting control](#).
- **Pearl Nano** - While actively recording a channel that includes a layout with multiple video input sources, a new file is created if an additional video input source is added to the channel.
- **Pearl Nano** - If the channel that is recording is an auto channel, a new recording is started if the video input source automatically switches from one video source to another due to signal loss.

Tested media players

Epiphan has tested recordings with the following players. See [Troubleshooting Quick Reference](#) for known player issues.

Table 54 Tested Media Players

Operating System	Tested Players
Mac OS	<ul style="list-style-type: none"> • QuickTime 10.3 • QuickTime 7.6.6+ • VLC 2.2.4 • Playback Pro 2.3.2 • Final Cut Pro 10.3.2 • Adobe Premiere Pro CC 2017



Operating System	Tested Players
Windows	<ul style="list-style-type: none"> • QuickTime 7.6.6+ • VLC 2.2.6 • Windows Media player 12+ • Movies & TV (Windows 10) • Adobe Premiere Pro CC 2015
Linux	<ul style="list-style-type: none"> • MPlayer • VLC 2.2.2
HTML 5 Browsers (Windows)	<ul style="list-style-type: none"> • Google Chrome 37+ (works with MOV and MP4 files using H.264 codec)



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

Pearl Mini and Pearl Nano recording storage information

- An SD card (or a SATA M.2 2280 SSD on Pearl Nano) must be installed to record, see [SD card and SATA M.2 2280 SSD storage](#).
- After an SD card is formatted using Pearl Nano or Pearl Mini, do not manually change the default file folder structure on the SD card.
- Ejecting the SD card while the recording is in progress may corrupt the SD card and cause loss of data. Power down the Pearl device before ejecting the SD card. Stop all recording before powering down the system.
- The maximum file size cannot be larger than a quarter of the total available space on the SD card. For example, the maximum file size limit for a 64 GB SD card is 16 GB. A warning appears if you set a file size limit that is bigger than a quarter of the SD card capacity.
- If you set the file size limit and then swap in a smaller SD card, you must change the file size limit to a smaller size using the Admin panel if the file size limit is bigger than the SD card.
- Recording with a file size limit that exceeds the size of the SD card will corrupt the SD card.



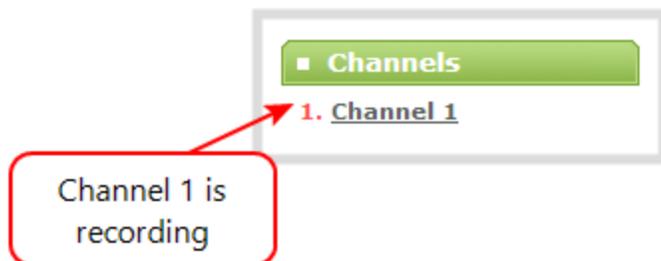
- Newer recordings overwrite oldest recordings when the amount of free space on the SD card (or M.2 SSD) is less than the configured recording file size limit.
- The SD card is formatted for Ubuntu systems and is not compatible with Windows and Mac devices. To download recordings, see [Manage recorded files](#).
- We recommend using large capacity SD cards such as 256 GB (or a large capacity M.2 SSD when using Pearl Nano) with a CMS. Do not schedule recordings that are longer than the capacity of the storage device to store the recording to the storage medium.
- We recommend using large capacity SD cards such as 256 GB or more when using a CMS. Do not schedule recordings that are longer than the capacity of the Pearl device to store the recording.
- If you create multiple recorders and start recording them at the same time, the SD card will be corrupted if the total of the file size limits for each recorder exceeds the size of the SD card.
- For instructions on how to use Pearl Nano's front screen to start/stop scheduled recordings for a CMS event, see [Stop/start scheduled CMS events using Pearl Nano's front screen menu](#).
- The maximum file size cannot be larger than a quarter of the total available space on the SD card. For example, the maximum file size limit for a 64 GB SD card is 16 GB. A warning appears if you set a file size limit that is bigger than a quarter of the SD card capacity.
- If you set the file size limit and then swap in a smaller SD card, you must change the file size limit to a smaller size using the Admin panel if the file size limit is bigger than the SD card.
- Recording with a file size limit that exceeds the size of the SD card will corrupt the SD card.
- Newer recordings overwrite oldest recordings when the amount of free space on the SD card is less than the configured recording file size limit.

Record a channel

Using the Admin panel , you can start and stop recording a channel, as well as configure recording settings for the channel. You can also start and stop recording using Epiphan Edge, or:

- **Pearl Nano** - the Record control key on the front panel

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

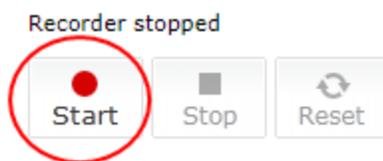




 If PoE+ power is interrupted while Pearl Nano is actively recording, the recorded file could become corrupted and be unplayable.

Start and stop recording using the Admin panel

1. Login to the Admin panel as **admin** or **operator**, see [Connect to the Admin panel](#).
2. From the **Channel(s)** menu, select the channel and click **Recording**. The channel recording menu opens.
3. Select **Start** to start recording the channel and select **Stop** when you're done.



 If the Start button is not active, there are no active sources for the channel. Check your inputs to ensure signals are working as expected.

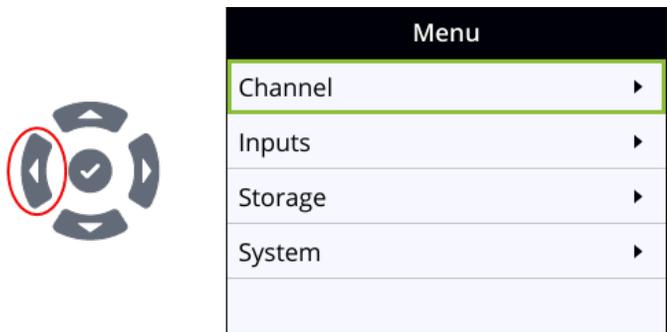
Start and stop recording using the Record control key on the Pearl Nano

Simply press the **Record control key** on Pearl Nano's front panel to easily start and stop recording a channel. The Record control key glows solid red and the recording timer on the Channel view increments while recording is in progress. When you're done, press the Record control key again to stop recording. For more information, see [Record and stream using the control keys](#).

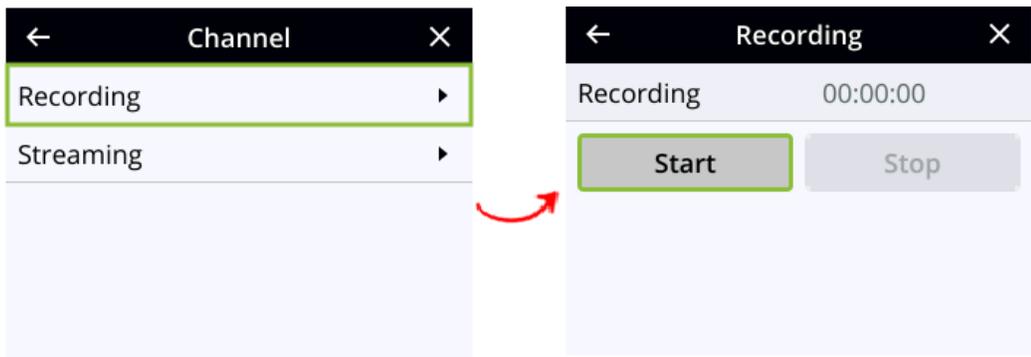


Start and stop recording using the front screen menu on Pearl Nano

1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **Channel**. Then from the Channel screen, select **Recording** to open the Recording screen.



3. From the Recording screen, use the arrow keys to highlight **Start** and press the **check mark** key start recording. When you're done, highlight **Stop** and press the **check mark** key to stop recording.

Configure recording settings, file size, and type

Recordings are saved as MP4 files by default. The channel also has the default file size limit set to 500 MB and the default maximum time limit set to 30 minutes. When a recording reaches the file length of 30 minutes or 500 MB (whichever comes first), the system closes the current recording file and immediately opens a new one. No recorded data is lost.

 If you don't know what size to select, do some test recordings to get an idea of the file sizes you can expect. If you want to guarantee the recording lasts to a given time limit, select a file size that is far larger than you saw in your tests.

Important considerations

- You cannot change the recording settings, file size, and type for channels used with Kaltura, Panopto, YuJa, and Opencast events.

The following table describes the recording configuration settings.

Table 55 Recordings Configuration Settings

Label	Description / Options
Time limit	<p>Specifies the length of time the system waits before the recording file is saved and a new one is started (assuming the size limit has not yet been reached). Values range from 5 minutes to unlimited. The MOV file type is limited to a maximum duration of 13h15m, regardless of the value set in the Admin Panel.</p>
Size limit	<p>Specifies the maximum file size a recording can reach before it is saved and a new recording is started (assuming the time limit has not yet been reached).</p> <ul style="list-style-type: none"> • Maximum storage depends on the size of the SD card (or SATA M.2 SSD) installed
File type	<p>Specifies the recording file type. Select from AVI, MP4, MP4-Fragmented, MPEG-TS, or MOV.</p> <ul style="list-style-type: none"> • AVI: Generally used for playback on Windows. • MP4: A progressive version of MP4. Select MP4 for the best compatibility with most video players and editors. Progressive MP4 files are initially recorded as MP4-Fragmented and are converted when the recording ends. <div data-bbox="412 1226 1446 1400" style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;">  <p>If the recording is stopped while in progress or during conversion, the files remain in fragmented MP4 format. You can run the file through ffmpeg or another transcoder to convert to the progressive format.</p> </div> <ul style="list-style-type: none"> • MP4-Fragmented: A newer MP4 format. Fixed 10 second intervals. Select MP4-Fragmented for the same file format as releases 3.15.x. Some applications, like Adobe Premiere Pro, don't yet support fragmented MP4. There's no way to tell the difference between MP4 files and MP4-Fragmented files from the file name because both use the .mp4 extension. • MPEG-TS: Does not support PCM audio encoding. • MOV: A progressive version of MOV. Generally used for playback on Mac OS. This type of MOV has the best compatibility with video players and editors.



Label	Description / Options
Filename prefix	<p>Specifies how the recordings are named. Recording files start with the given prefix followed by the date and time of the recording, which is set by the system. The channel or recorder name is used if no prefix is given. Allowed characters: A-Z, a-z, 0-9, _ , #, -, [], ().</p> <p>Avoid using spaces in recording file names. Use underscores or hyphens to separate words instead.</p>
Automatic file upload	<p>Select this if you want this channel or recorder to be part of any scheduled automatic uploads. See Automatic file transfers for information on automatic uploads.</p>

Change the recording configuration using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. Open the recording page:
 - Click the name of the Channel and then click **Recording** from the options that appear.
3. Under Recorder Setup, select **change**. The recorder settings open.
4. Change the default recording file settings.
 - **Time limit:** Select a value from 5 minutes to unlimited.
 - **Size limit:**
 - Select a value from the listed options. The range depends on the size of the SD card or SATA M.2 SSD installed, up to a maximum of 64 GB.
 - **File type:** AVI, MPEG-TS, MOV, MP4, or MP4-Fragmented.
5. (Optional) Enter a prefix for the recordings. All new recorded files for this channel or recorder will be prefixed using the text you enter.
6. (Optional) Check the check box to exclude this channel from automatic file uploads, see [Automatic file transfers](#).
7. Click **Apply**.

Restart recording to a new file

Recordings are automatically saved to a file and a new recording is started when:

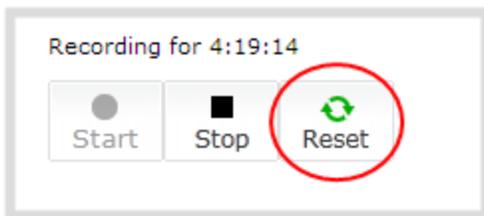
- The recording reaches the configured time or size limit.
- The channel name is changed.

- Changes are made to the stream if recording and streaming the channel.

You can manually force a recording that's in progress to save to a file and continue recording in a new file from that point forward without any loss of content. This is useful if you need to download a recording since you cannot download recordings that are in progress.

Restart recording to a new file using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. **Pearl Nano** - From the Channel menu, select **Recording**. The Recording page opens.



3. Select **Reset** to stop the current recording and start a new recording.
4. Refresh the page to see the updated list of recordings.

Manage recorded files

Pearl Mini and Pearl Nano save recordings by default to the SD card (or SATA M.2 2280 SSD on Pearl Nano). When the SD card is full, new recordings overwrite the oldest recordings. You can not manually transfer recordings off the SD card to iOS or Windows systems.

There are a variety of ways to automatically transfer files from the system to local network storage. You can also manually select individual recordings to transfer or delete using the Admin panel.

For information about automatic file transfers, see [Automatic file transfers](#).

Manage the recordings for a channel using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. **Pearl Nano** - From the Channel menu, select **Recording**. The Recording page opens.
3. All recordings are listed and sorted by date.

Files that are part of the same recording session are listed one after another. Three dots appear between files of different recording sessions. The file currently being recorded (if applicable) is shown at the top of the list. It cannot be modified or downloaded until it has finished recording.

4. If there are no recordings, a message indicates there are no recorded files for this channel or recorder.



- To *download an individual file*, select the recording filename to download it.
- To *download multiple files*, select the check box next to the recordings to download and then click **Download Selected**. The files are download as a .zip file containing the selected recordings.
- To *rename a recorded file*, select the edit icon next to the file name you want to change. Type the new file name and press **Enter** using your keyboard.
- To *view a recorded file*, click on the triangle Play button next to the file you want to play back. This will open the video file in an HTML5 player within the browser for viewing.



The Admin panel keeps track of the filename extension (i.e. .avi) so you do not need to include it when renaming the file.

- To *delete a single recording*, click the X icon to the right of a recording and click **OK** when prompted.
- To *delete multiple recordings*, check the check box beside the recordings you want to delete, then click **Delete Selected**. Click **OK** when prompted.
- To *delete all recordings* for the channel, click **Delete All** and click **OK** when prompted.



The list may not update immediately. You can refresh the list by reloading the Recording page (for channels) or the recorder settings page (for recorders).

For information about automatic file transfers, see [Automatic file transfers](#).

Join recorded files together

After recording files on Pearl Nano, you can join two or more files together. This is useful when a recording exceeds the maximum recording time limit and the recording is split into multiple files. You can use the third-party tool called `ffmpeg` to join the files.

Download `ffmpeg` from the Internet and join multiple recorded files

1. Download the files that you need from Pearl Nano and make sure you have the right paths and file names. For example:

```
C:\Users\JoesComputer\downloads\Program_A_May11_16-24-56.avi
```

2. Use the command `ffmpeg -i` to specify the input file. For example:

```
ffmpeg -i C:\Users\JoesComputer\downloads\Program_A_May11_16-24-56.avi
```

3. Repeat the process and specify the file you want to join to the first file. You can keep adding as many files as you want to join together. For example, specifying a second file looks like this:

```
ffmpeg -i C:\Users\JoesComputer\downloads\Program_A_May11_16-24-56.avi -i  
C:\Users\JoesComputer\downloads\Program_A_May11_12-26-14.avi
```

4. Use the `-c copy` command to specify the output file. After the command, type in the location, file name and file extension that you want for the concatenated file. The full line looks like this:

```
ffmpeg -i C:\Users\JoesComputer\downloads\Program_A_May11_16-24-56.avi -i  
C:\Users\JoesComputer\downloads\Program_A_May11_12-26-14.avi -c copy  
C:\Users\JoesComputer\Desktop\Concatenated_File.avi
```

5. After completing the process, you will be able to access your new file in the location you specified. The file moves straight from the first video into the second without a pause.



You can this process to join multiple files; however, the more files you join, the greater the chance that some audio desynchronization can occur between the clips.

Automatic file transfers

Pearl Nano can be configured to automatically upload recordings from local storage to a network storage location or an attached USB drive. This is called Automatic File Upload, or AFU for short. You can schedule automatic file uploads for a time and day that's most convenient for your workflow.

Topics include:

- [About Automatic File Upload \(AFU\)](#)
- [Set channels and recorders to include in AFU](#)
- [Enable AFU, schedule, and set options](#)
- [Configure AFU to Epiphan Edge](#)
- [Configure AFU to FTP server parameters](#)
- [Configure AFU to SFTP server parameters](#)
- [Configure AFU to RSync server parameters](#)
- [Configure AFU to CIFS server parameters](#)
- [Configure AFU to SCP client parameters](#)
- [Configure AFU to AWS S3 parameters](#)
- [Configure AFU to WebDav server parameters](#)
- [AFU or copy to USB](#)

To manage the AFU queue and view the AFU upload logs:

- [Add recordings to an AFU queue](#)
- [Manage the AFU queue](#)
- [View AFU and file transfer progress](#)
- [Manage USB file transfer queue](#)
- [View the AFU log](#)

About Automatic File Upload (AFU)

Pearl Nano can automatically upload recorded files to an accessible off-system storage location. You can set the file transfer to happen after a set amount of time or after the file completes recording.

There are additional settings to help you manage your AFU recordings and avoid file name collisions at the AFU server side. You can:

- Automatically create a folder for your recorded files using the channel name.
- Save recordings to a folder that's labeled using Pearl Nano's serial number.

Automatic File Upload (AFU) is not enabled by default. You must enable this feature for a channel that you want included in automatic file transfers. A log file of all file transfers is created that you can view anytime from the Admin panel.

The following types of off-system storage are supported for AFU:

- Epiphan Edge
- FTP/SFTP
- RSync
- CIFS
- SCP
- Amazon Web Server 3 (AWS S3)
- WebDav
- USB Drive

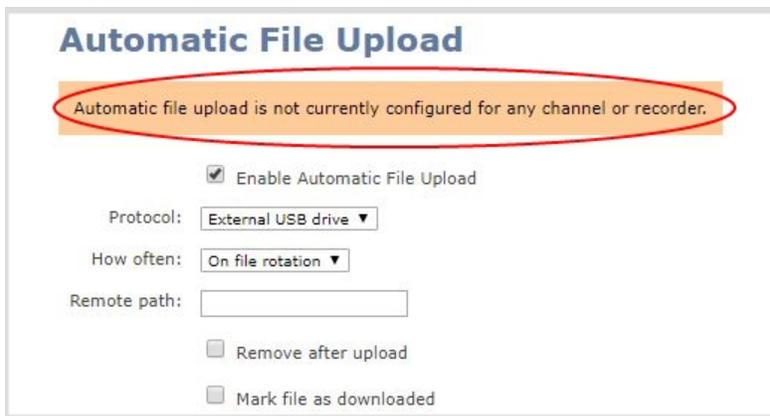
Important considerations

- Only **one** type of AFU can be used for all file transfers from the same channel.
- Automatic File Upload (AFU) is not available while Content Management System (CMS) is enabled on Pearl Nano.
- Files are automatically uploaded only once. New recordings created during later sessions do not overwrite files that were previously uploaded. A new file is uploaded.
- If the connection is lost during the transfer, the transfer automatically restarts when the connection is reestablished.
- If recorded files are selected for upload while the AFU is at maximum upload capacity or when the AFU is unavailable, they are added to an upload queue. Files and their relevant information are displayed in a list and are uploaded when the upload capacity becomes available.
- If recordings are selected for Automatic File Upload (AFU) while AFU is at maximum upload capacity or when AFU is unavailable, the recordings are added to an upload queue. If there is no available space left, new recordings fail and do not overwrite recordings in the AFU queue.

Set channels and recorders to include in AFU

When configuring automatic file upload (AFU), you need to tell the system which channels and recorders you want included in the upload schedule. If no channels or recorders are configured as a part of AFU, the following message appears in the Automatic File Upload configuration page.

You must enable Automatic File Upload (AFU) for the channel before you can include channel recordings in the upload schedule. If AFU is not enabled for the channel, the following message appears in the Automatic File Upload configuration page.



Set a channel or recorder to include in the AFU schedule using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. Click **Recording** in the Channel(s) menu.
3. Under **Recorder Setup**, select **change**. The recorder settings open.
4. Check **Automatic file upload** and click **Apply**.

What's Next

After you've enabled AFU for your channels and recorders, enable AFU and configure the AFU settings for the location type (i.e. FTP, USB, AWS, etc).

Enable AFU, schedule, and set options

After the channels and recorders you want to include in your Automatic File Upload (AFU) are selected, you can enable AFU and schedule when and where you want the recorded files to upload. To select channels and recorders to include in AFU, see [Set channels and recorders to include in AFU](#) .

By default, recorded video files are uploaded as soon as recording stops. However, you can schedule file uploads to only occur during a specific period of time every 24-hours. Recordings that end within the configured time period automatically upload right away. Recordings that end outside the upload time period are queued up and upload when the scheduled upload time period is reached.



To use AFU scheduling with a CMS, make sure to select a start and end time that provides enough upload time for all the files to upload to the CMS.

If you want to use the reset button to force the current recording to close and open a new one or want to limit the recorded file size, see [Configure recording settings, file size, and type](#).



Recorded files saved before automatic file upload is configured are not included as part of the automatic upload.

The following table describes the AFU options.

Table 56 AFU options

Option	Description
Remote path	If no remote path is specified, the files are copied to the root folder of the destination file system.
Remove after upload	Delete files from local storage on Pearl Nano when the upload completes.
Mark file as downloaded	Change the color of the file in the recording list to show the files are downloaded. This only applies if the files are not deleted after upload is complete.
Create a subfolder for each channel	Save the downloaded files into a folder using the channel name.
Create a subfolder for device	Save the downloaded files into a folder using the serial number of Pearl Nano.

Enable AFU and set a schedule or AFU options using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Automatic File Upload**. The Automatic File Upload configuration page opens.



If your screen does not indicate that AFU is enabled for at least one channel or recorder, return to [Set channels and recorders to include in AFU](#) .

3. Check **Enable Automatic File Upload**.
4. (Optional) Enter a remote path. If no path is specified, the files are copied to the root folder of the destination file system.
5. (Optional) Check any optional parameter to select it. For example, you can check **Mark file as downloaded** and **Create a subfolder for each channel**.
6. To schedule AFU, check **File upload schedule** and select a start time and an end time in the **Start upload** and **Stop upload** fields to define the automatic file upload period.

7. Click **Apply**.



If AFU to your server fails, check the server configuration and permissions.

Configure AFU to Epiphan Edge

You can automatically upload recordings to your Epiphan Cloud team, stored and viewed within Epiphan Edge, when you select Epiphan Edge as the AFU protocol transfer type using the Admin panel.

There are no specific settings to configure - simply press apply once choosing Epiphan Edge!

You must be subscribed to the file management feature in your Epiphan Cloud team, found on the billing and usage page, and have a Pearl device(s) paired to Epiphan Edge on the same team to upload recordings.

For more information, check [the Epiphan Edge user guide](#).

Configure AFU to FTP server parameters

You can automatically upload recordings to an FTP server when you select FTP as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure for AFU to an FTP server.

Table 57 FTP Automatic Upload Configuration Parameters

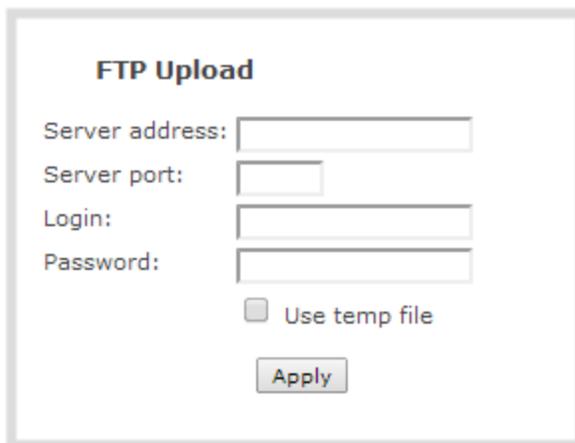
Name	Description
Server address	The IP address (or fully qualified domain name) of the FTP server.
Server port	The port used by the target FTP server. Standard port is 21.
Login	User name for the FTP server.
Password	Password for the FTP user.
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4 or .avi).

Prerequisites

- Channels and/or recorders are already added for AFU, see [Set channels and recorders to include in AFU](#).
- AFU is enabled and the parameters configured, see [Enable AFU, schedule, and set options](#).

Configure AFU upload to an FTP server using the Admin panel

1. From the Automatic File Upload configuration page, select **FTP Client** as the protocol transfer type.



2. Specify the target **Server address**. If your system is configured with DHCP or has a valid DNS configuration (see [Configure DHCP](#)), you can use the server's fully qualified domain name instead of the IP address.
3. Specify the **Server Port** used for the target FTP server. The standard port is 21.



4. Enter the FTP account username in the **Login** field.
5. Enter the FTP account password in the **Password** field. The characters are masked with dots.
6. Select **Use temp file** to name files with a temporary filename extension (.part) on the server until upload is complete.
7. Click **Apply**.

Configure AFU to SFTP server parameters

You can automatically upload recordings to a secure FTP (SFTP) server when you select SFTP as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure AFU to an SFTP server.

Table 58 SFTP Automatic Upload Configuration Parameters

Name	Description
Server address	The IP address or fully qualified domain name of the SFTP server.
Server port	The port used by the target SFTP server. Standard port is 22.
Login	Username for the SFTP server.
Password	Password for the SFTP user.
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4 or .avi).

Prerequisites

- Channels and recorders are already added for AFU, see [Set channels and recorders to include in AFU](#) .
- AFU is enabled and the parameters configured, see [Enable AFU, schedule, and set options](#).

Configure AFU upload to an SFTP server using the Admin panel

1. From the Automatic File Upload configuration page, select **SFTP Client** as the protocol transfer type.

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 Pearl Nano. This key must be trusted by the destination server. Details for generating the key and setting up this trust are beyond the scope of this document.

7. (Optional) Set up SSH identity for SCP and SFTP clients. If no identity is uploaded, or to upload a new identity (overwrites the old identity):



- a. Click **Choose File** and navigate to select the private key file from your hard drive, then click **Open**.
- b. Click **Upload** to upload the file.



The system accepts RSA keys for SSH-1; DSA, ECDSA, EC25519 and RSA for SSH-2. Keys must be in **OpenSSH** format.

- c. (Optional) Use the **Test your key** field to test your uploaded key against the secure server.
8. Click **Apply**

Configure AFU to RSync server parameters

You can automatically upload recordings to an RSync server when you select RSync as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure for AFU to an RSync server.

Table 59 RSync Automatic File Upload Configuration Parameters

Name	Description
Server address	The IP address (or fully qualified domain name) of the RSync server.
Server	The name of the shared folder on the RSync server.

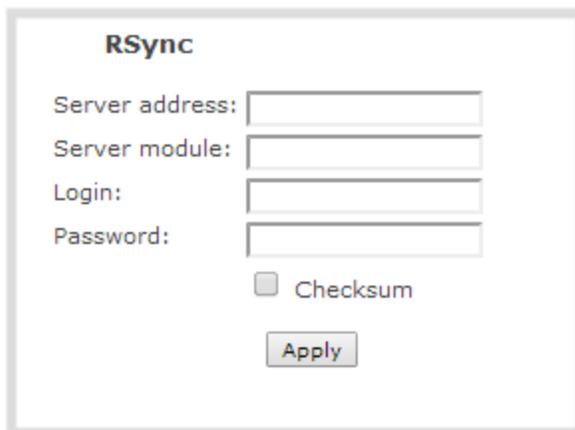
Name	Description
module	
Login	Username for the RSync server.
Password	Password for the RSync user.
Checksum	Select to enable checksum checking during file transfer. This increases the time taken to transfer, but also increases reliability of the transfer.

Prerequisites

- Channels and recorders are already added for AFU, see [Set channels and recorders to include in AFU](#).
- AFU is enabled and the parameters configured, see [Enable AFU, schedule, and set options](#).

Configure AFU upload to an RSync server using the Admin panel

1. From the Automatic File Upload configuration page, select **RSync Client** as the protocol transfer type.



2. Specify the target **Server address**. If your system is configured with DHCP or has a valid DNS configuration (see [Configure DHCP](#)), you can use the server's fully qualified domain name instead of the IP address.
3. Specify the **Server module**. This is the name of the shared folder on the server. If needed, request this value from your network administrator.
4. Specify a username for the RSync Server in the **Login** field. The user must have write permissions for the module.
5. Specify the password for the user in the **Password** field; the value is masked by dots.



6. (Optional) Select the **Checksum** check box to add a checksum validation to the transfer between the system and the recipient server.
7. Click **Apply**.

Configure AFU to CIFS server parameters

You can automatically upload recordings to a CIFS server (also known as SMB or samba) when you select CIFS as the AFU protocol transfer type using the Admin panel. SMB2 and SMB3 are supported.

The following table describes the parameters to configure AFU to a CIFS server.

Table 60 CIFS Automatic File Upload Configuration Parameters

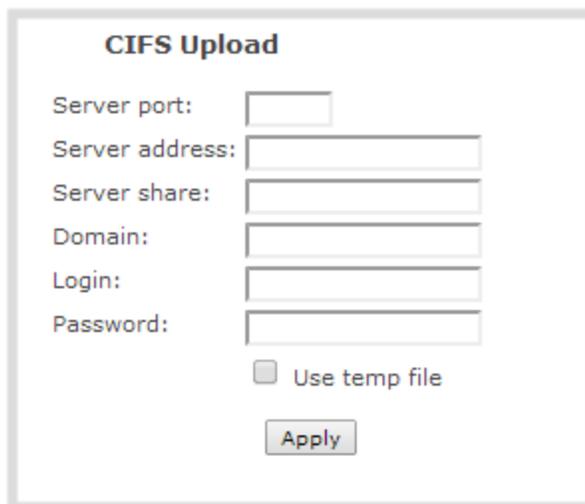
Name	Description
Server Port	The CIFS server port. Leave blank to use the default port, or enter the port used for your CIFS server.
Server address	The IP address (or fully qualified domain name) of the CIFS server.
Server share	The name of the shared folder on the CIFS server.
Domain	The CIFS server's Windows domain or Work Group name . Needed if the server is part of Active Directory or a Domain Controller.
Login	Username for the CIFS server.
Password	Password for the CIFS user.
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4, .ts or .avi).

Prerequisites

- Channels and recorders are already added for AFU, see [Set channels and recorders to include in AFU](#) .
- AFU is enabled and the parameters configured, see [Enable AFU, schedule, and set options](#).

Configure AFU upload to a CIFS server using the Admin panel

1. From the Automatic File Upload configuration page, select **CIFS Client** as the protocol transfer type.



2. Specify the target **Server address**. If your system is configured with DHCP or has a valid DNS configuration (see [Configure DHCP](#)), you can use the server’s fully qualified domain name instead of the IP address.
3. Enter the target **Server port**, if you have configured the server to use something non-standard. Leave this value blank to use the default port.
4. Specify the **Server share**. This is the CIFS share name or the name of the shared folder on the server. If needed, request this value from the network administrator.
5. If the system is in a different domain than the server or if it is part of Active Directory, enter the **Domain name** of the CIFS server.
6. Specify a username for the CIFS Server in the **Login** field. The user must have write permissions for the share folder.
7. Specify the password for the user in the **Password** field; the value is masked by dots.
8. Select **Use temp file** to name files with a temporary filename extension (.part) on the server until upload is complete.
9. Click **Apply**

Configure AFU to SCP client parameters

You can automatically upload recordings to an SCP (secure copy) client when you select SCP as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure AFU to an SCP client.

Table 61 SCP Automatic Upload Configuration Parameters

Name	Description
Server address	The IP address (or fully qualified domain name) of the destination server.
Server port	The SCP port used by the target server. Standard port is 22.
Login	Username for the SCP server.
Password	Password for the SCP user.

Prerequisites

- Channels and recorders are already added for AFU, see [Set channels and recorders to include in AFU](#) .
- AFU is enabled and the parameters configured, see [Enable AFU, schedule, and set options](#).
- Ensure there is adequate space on the destination device, if space may be an issue disable the AFU option 'Remove after upload' to avoid accidental deletion of files.

Configure AFU upload to an SCP client using the Admin panel

1. From the Automatic File Upload configuration page, select **SCP Client** as the protocol transfer type.



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 Nano. This key must be trusted by the destination server. Details for generating the key and setting up this trust are beyond the scope of this document.

- 6. (Optional) Set up SSH identity for SCP and SFTP clients. If no identity is uploaded, or to upload a new identity (overwrites the old identity):



- a. Click **Choose File** and navigate to select the private key file from your hard drive, then click **Open**.
- b. Click **Upload** to upload the file.

 The system accepts RSA keys for SSH-1; DSA, ECDSA, EC25519 and RSA for SSH-2. Keys must be in **OpenSSH** format.

- c. (Optional) Use the **Test your key** field to test your uploaded key against the secure server.
- 7. Click **Apply**

Configure AFU to AWS S3 parameters

You can automatically upload recordings to an Amazon Web Server (AWS) when you select AWS S3 as the AFU protocol transfer type using the Admin panel.



The following table describes the parameters to configure AFU to a bucket on Amazon Simple Storage Solution (S3).

Table 62 AWS Automatic Upload Configuration Parameters

Name	Description
AWS Region Code	The geographical region of the AWS server that contains the bucket you want to upload to, e.g. us-east-2.
Bucket	The id of the data storage container you created in Amazon S3 for the recorded live streaming files.
Access Key Id	The Access Key ID is part of your access key for your AWS account and is a required parameter, i.e. GAKSOSIFDONN2EXAMPLE.
Secret Access Key	The Secret Access Key is part of your access key for your AWS account and is a required parameter, i.e.bHaprXUenFEMI/K6MANVG/cPxDfiBYEXAMPLEKEY.
Session Token	The temporary security token provided by the AWS Security Token Service (STS) that allows access to your AWS account for authorized users.

Prerequisites

- You must have read and write privileges for your AWS account before you can setup AFU to upload to an AWS S3 location. You also need the AWS Access Key ID and Secret Access Key.
- Channels and recorders are already added for AFU, see [Set channels and recorders to include in AFU](#).
- AFU is enabled and the parameters configured, see [Enable AFU, schedule, and set options](#).

Configure AFU upload to AWS S3 using the Admin panel

1. From the Automatic File Upload configuration page, select **AWS S3 Client** as the protocol transfer type.

AWS S3 Upload

AWS Region Code:

Bucket:

Access Key Id:

Secret Access Key:

Session Token:

2. Specify the **AWS Region Code** and the data storage **Bucket** where you want to upload the file.
3. Enter your **AWS Access Key Id** and **Secret Access Key** to authenticate access to the AWS S3 data storage bucket.

 Failure to provide these values could result in content loss if **Remove after uploading** is selected.

4. In the **Session Token** field, enter the temporary token you got from the AWS Security Token Service (STS).
5. Click **Apply**.

Configure AFU to WebDav server parameters

You can automatically upload recordings to a WebDav server when you select WebDav as the AFU protocol transfer type using the Admin panel.

The following table describes the parameters to configure AFU to a WebDav server.

Table 63 WebDav Automatic Upload Configuration Options

Name	Description / Options
Server address	The IP address (or fully qualified domain name) of the FTP server.
Server port	The port used by the target WebDav server. Standard port is 21.

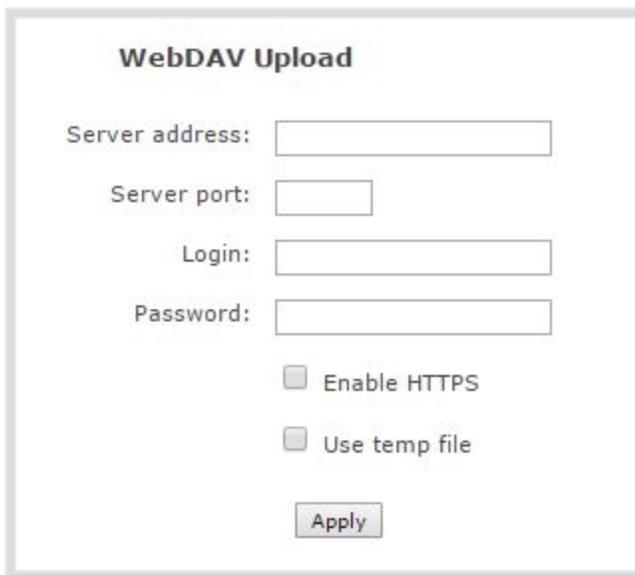
Name	Description / Options
Login	Username for the WebDav server.
Password	Password for the WebDav user.
Enable HTTPS	Select if you need to use a secured HTTPS link to the WebDav server.
Use temp file	Causes files to be named with .part extension on the server during active upload. When the upload completes, the file is renamed to the appropriate extension (.mov, .mp4 or .avi).

Prerequisites

- Channels and recorders are already added for AFU, see [Set channels and recorders to include in AFU](#) .
- AFU is enabled and the parameters configured, see [Enable AFU, schedule, and set options](#).

Configure AFU upload to a WebDav server using the Admin panel

1. From the Automatic File Upload configuration page, select **WebDav Client** as the protocol transfer type.



WebDAV Upload

Server address:

Server port:

Login:

Password:

Enable HTTPS

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 WebDav server. The standard port is 21.

4. Enter the FTP account username in the **Login** field.
5. Enter the FTP account password in the **Password** field. The characters are masked with dots.
6. Select **Enable HTTPS** if you need a secure HTTPS link to the WebDav server.
7. Select **Use temp file** to name files with a temporary filename extension (.part) on the server until upload is complete.
8. Click **Apply**.

AFU or copy to USB

The Pearl Nano has USB 3.0 ports (a single port on Pearl Nano) that you can use to copy recordings to external USB flash drives or hard drives. Use this to conveniently provide speakers with a copy of their presentation before they leave the presentation venue.

A USB port is available on the back panel of the Pearl device.

The USB storage device must be formatted with one of the following file systems:

- FAT16
- FAT32
- exFAT
- EXT2
- EXT3
- EXT4
- XFS
- NTFS

We recommend you only connect one USB device to a Pearl device at a time. Only one copy or move to USB operation is permitted at a time, even though the UI may appear to let you start a second one. Please wait until the first is complete before starting a new operation.

To view AFU and monitor file transfer progress on the Pearl's screen, see [View AFU and file transfer progress](#).

Topics include:

- [Automatic File Upload to a USB storage device](#)
- [One-time copy all recordings to USB storage device](#)
- [Manually copy recordings to USB](#)
- [Manage USB file transfer queue](#)
- [Manage USB drive](#)

AFU to a USB storage device

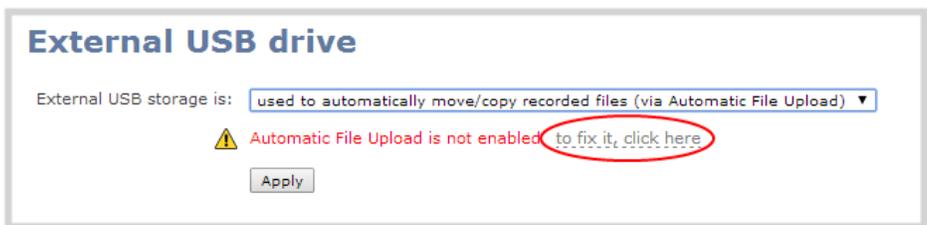
Transfer recordings to a USB storage device automatically when you select an external USB device as the AFU protocol transfer type using the Admin panel.

Prerequisites

- A properly formatted USB device must be connected to a USB port on the Pearl device.
- Channels and/or recorders are already added for AFU, see [Set channels and recorders to include in AFU](#).
- AFU is enabled and the parameters configured, see [Enable AFU, schedule, and set options](#).

Configure AFU upload to a USB storage device using the Admin panel

1. From the Automatic File Upload configuration page, select **External USB Drive** as the protocol transfer type. If your Automatic File Upload setting conflicts with your new USB device setting, a message is displayed. Click the **fix it** link and click **Apply**.





The fix it link disables any other type of automatic file upload you have configured. When you are done with USB uploads, return to the **Automatic File Upload** configuration page and reconfigure your AFU settings.

2. (Optional) Select **Create a subfolder for each channel** to have recordings organized by channel. Pearl Nano only has a single channel.
3. Click **Apply**.

Do a one-time move/copy all recordings to USB storage device

When one-time move/copy of files is configured, the Pearl device automatically starts copying files as soon as you connect a USB storage device to the USB port.

Newest recordings are copied first. Files continue copying over until one of the following events occur:

- all files are copied
- the specified maximum number of files are copied
- the target drive runs out of storage space

File that are currently recording do not transfer until recording ends.

The following table describes the options available for a one-time move/copy of recordings to a USB storage device.

Table 64 One-Time Move/Copy File Transfer Options

Name	Description
create subfolder with serial number (<serial>)	If checked, the transfer process creates a sub-folder with the system's serial number on the USB drive. This is useful if you are using the same drive to collect recordings from multiple systems and want to know which system they came from.
create subfolder for the channel	If checked, the transfer process creates a sub-folder for the channel into which the files are copied (within the subfolder for the serial number, if that option is also selected).
remove after copying	If checked, the file(s) are removed after being copied to the USB drive. Checking this box makes the transfer a move instead of a copy.
mark file as downloaded	If checked, the files that are downloaded are marked with a downloaded icon when viewing file lists. This has no effect if remove after copying is checked.
ignore already downloaded files	If checked, files that were previously downloaded or marked as downloaded are not included in subsequent downloads.



If your USB drive has no activity indicator to let you know when the transfer is complete, select the one-time move/copy option to **remove after copying** or **mark the file as downloaded** so that you know when the transfer has finished.

Prerequisites

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

Configure a one-time copy of all recorded files to a USB storage device using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **External USB Drive**. The External USB Drive configuration page opens.

3. Select **used for one-time move/copy** of the recorded files (upon insertion).

External USB drive

External USB storage is: used for one-time move/copy of the recorded files (upon insertion) ▼

Maximum number of files to transfer: 100

Create subfolder with device name (900156)

Create subfolder for the channel

Remove after copying

Mark file as downloaded

Ignore already downloaded files

File already exists: replace ▼

Apply

 If a conflict is reported regarding the Automatic file upload settings, click **Fix it** or go to the Automatic File Upload configuration page and either disable automatic file upload or switch to a non-USB based upload type.

4. Check the options you want to use for the one-time move/copy file transfer and click **Apply**.
5. Insert the USB storage device into the USB port on Pearl Nano. File transfer starts automatically.
6. Follow the steps to [Safely eject the USB storage device](#) when the activity light on the USB storage device stops flashing. If your USB device doesn't have activity indicators:
 - a. Check the **Recording** list for the channel to verify if there are files that have yet to be copied.
 - b. [Safely eject the USB storage device](#) when you are satisfied all files have been copied, or if you notice the USB storage device is out of space, see [View available USB storage space](#).

Manually copy recordings to USB storage device

You can manually copy recordings to a USB storage device that is connected to Pearl Nano. This procedure is separate from automatic file upload and does not need any pre-configuration in the automatic file upload page.

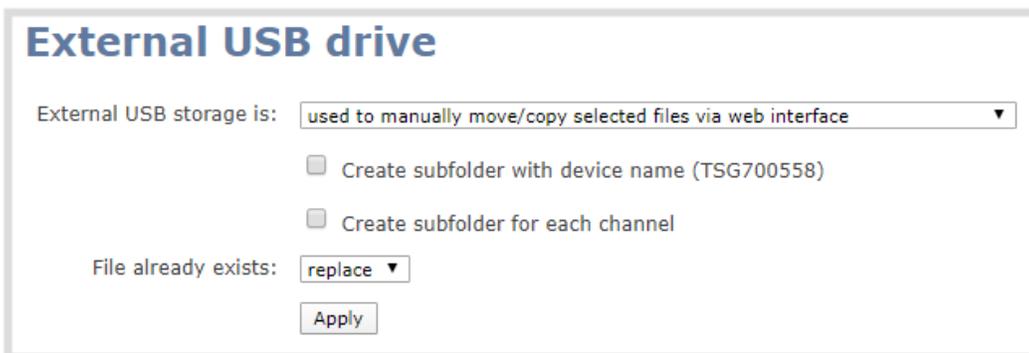
The following table describes the options available when manually copying recordings to a USB storage device.

Table 65 One-Time Move/Copy File Transfer Options

Name	Description
create subfolder with serial number (<serial>)	If checked, the transfer process creates a sub-folder with the system's serial number on the USB drive. This is useful if you are using the same drive to collect recordings from multiple systems and want to know which system they came from.
create subfolder for the channel	If checked, the transfer process creates a sub-folder for the channel into which the files are copied (within the subfolder for the serial number, if that option is also selected).
File already exists	Choose the action to take if a file with the same name already exists in the copy location: <ul style="list-style-type: none"> • replace (default) • skip • rename

Manually copy recorded files to a USB device using the Admin panel

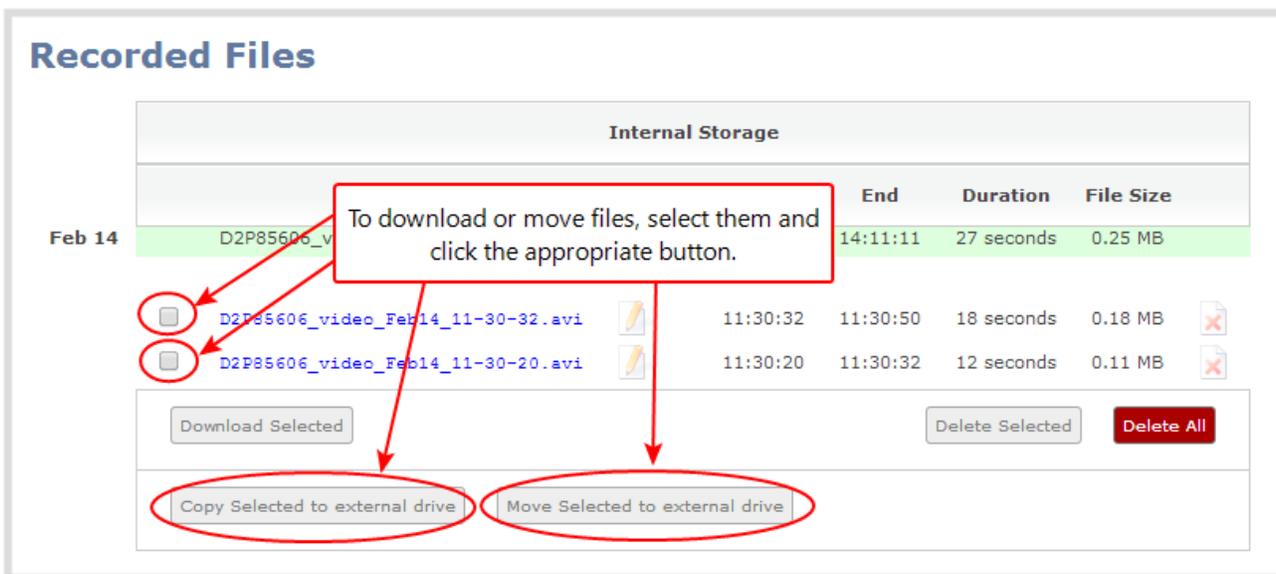
1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **External USB Drive link**. The External USB Drive configuration page opens.
3. Select **used to manually move/copy selected files via the Admin panel** and click **Apply**.



 If a conflict is reported regarding the Automatic file upload, click **Fix it** or go to the Automatic File Upload configuration page and disable automatic file upload or switch to a non-USB based upload type.

4. Insert your USB storage device into the USB port on Pearl Nano, then click **Recording** from the Channel menu in the Admin panel. The Recording page opens.
5. Check the files you want to download and do one of the following:
 - a. Click **Copy Selected to external drive** to copy the files to the USB drive.
 - b. Click **Move Selected to external drive** to move the files and delete them off of Pearl Nano.

In this example, the first file is currently recording and cannot be downloaded.



6. Follow the steps to Safely eject USB storage device when you're done.

View file transfer status and cancel file copy to a USB device

During a file transfer to an External USB drive, you can monitor the file transfer progress and cancel the file transfer using the Admin panel. You can only cancel the transfer of a file while it is in progress.

For other options to view the USB file transfer progress, see [View AFU and file transfer progress](#).

View file transfer to USB device status and cancel using the Admin panel

1. While the file transfer is in progress, select **External USB Drive** link from the Configuration menu in the Admin panel. The External USB Drive configuration page opens.
2. View the current file transfer status under the **Status** section. To cancel the current file transfer, select **Cancel** and confirm when prompted. The option to cancel only appears while the file transfer is in progress. The file that is highlighted in green is currently being transferred.

External USB drive

External USB storage is: used for one-time move/copy of the recorded files (upon insertion)

Maximum number of files to transfer:

- Create subfolder with device name (900156)
- Create subfolder for each channel
- Remove after copying
- Mark file as downloaded
- Ignore already downloaded files

File already exists: replace

Status

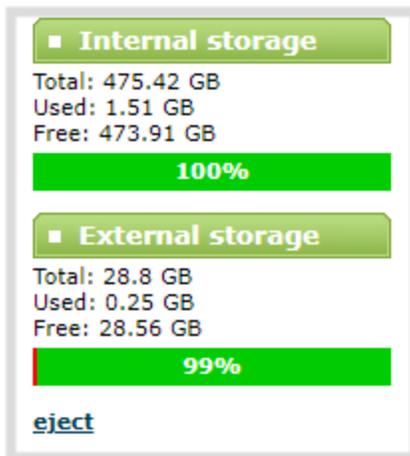
Processed 2 files from 10
Processed 84.8 MB from 251.6 MB
Estimated time: 8 seconds

	File Name	Start	End	Duration	File Size	Progress %	
2021 Feb 16	Auto_Feb16_10-00-18.mp4	15:00:18	15:00:54	36 seconds	24.9 MB	100	✘
	Auto_Feb16_08-29-56.mp4	13:29:56	13:30:53	57 seconds	40.8 MB	100	✘
	Auto_Feb16_08-15-01.mp4	13:15:01	13:18:24	03:23	143.2 MB	13	✘
2021 Feb 05	Auto_Feb05_08-11-30.mp4	13:11:30	13:11:55	25 seconds	18.2 MB	0	✘
	Auto_Feb05_08-09-13.mp4	13:09:13	13:09:19	6 seconds	4.1 MB	0	✘
2021 Feb 04	Auto_Feb04_07-35-09.mp4	12:35:09	12:35:11	2 seconds	1.9 MB	0	✘

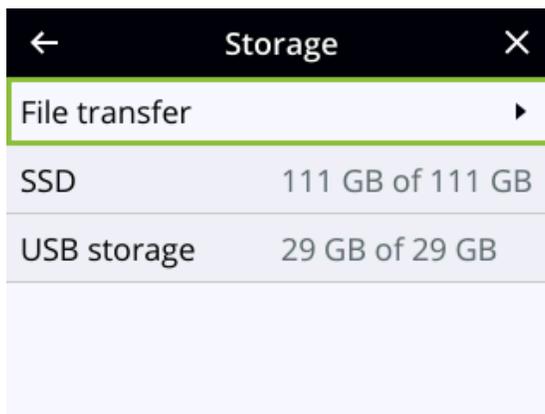
View available USB storage space

When you insert a USB storage device into a USB port and select an **External USB Drive** action other than **ignored** (i.e. manual copy, automatic copy, etc), the total and free space are calculated and displayed in the Admin panel.

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



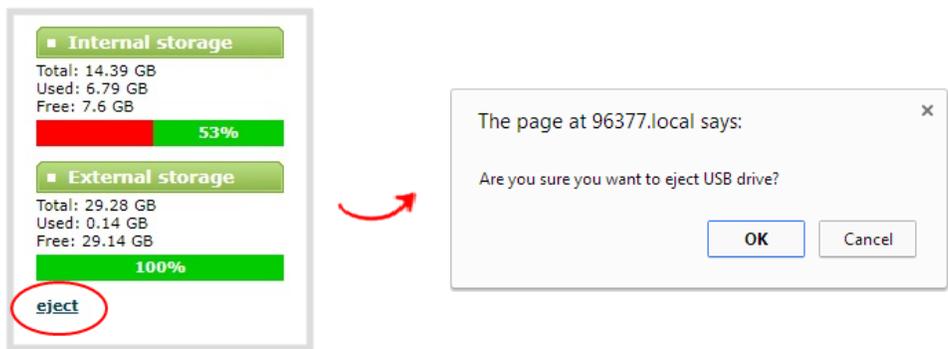
You can also view the storage capacity when you select **Storage** using the front screen menu. A USB storage device must be connected to see the USB storage listed.



Safely eject the USB storage device

When you're done saving recordings to the USB storage device, you can safely eject it using the link at the bottom of the Admin panel page.

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. At the bottom of the menus panel, click **eject** and click **OK** when prompted.



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

Automatic File Upload to a USB storage device

Transfer recordings to a USB storage device automatically when you select an external USB device as the AFU protocol transfer type using the Admin panel.

Prerequisites

- A properly formatted USB device must be connected to a USB port on the Pearl device.
- Channels and/or recorders are already added for AFU, see [Set channels and recorders to include in AFU](#).
- AFU is enabled and the parameters configured, see [Enable AFU, schedule, and set options](#).

Configure AFU upload to a USB storage device using the Admin panel

1. From the Automatic File Upload configuration page, select **External USB Drive** as the protocol transfer type. If your Automatic File Upload setting conflicts with your new USB device setting, a message is displayed. Click the **fix it** link and click **Apply**.



 The fix it link disables any other type of automatic file upload you have configured. When you are done with USB uploads, return to the **Automatic File Upload** configuration page and reconfigure your AFU settings.



2. (Optional) Select **Create a subfolder for each channel** to have recordings organized by channel. Pearl Nano only has a single channel.
3. Click **Apply**.

Manually copy recordings to USB

You can manually copy recordings to a USB storage device that is connected to Pearl Nano. This procedure is separate from automatic file upload and does not need any pre-configuration in the automatic file upload page.

The following table describes the options available when manually copying recordings to a USB storage device.

Table 66 One-Time Move/Copy File Transfer Options

Name	Description
create subfolder with serial number (<serial>)	If checked, the transfer process creates a sub-folder with the system’s serial number on the USB drive. This is useful if you are using the same drive to collect recordings from multiple systems and want to know which system they came from.
create subfolder for the channel	If checked, the transfer process creates a sub-folder for the channel into which the files are copied (within the subfolder for the serial number, if that option is also selected).
File already exists	Choose the action to take if a file with the same name already exists in the copy location: <ul style="list-style-type: none"> • replace (default) • skip • rename

Manually copy recorded files to a USB device using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **External USB Drive link**. The External USB Drive configuration page opens.
3. Select **used to manually move/copy selected files via the Admin panel** and click **Apply**.

External USB drive

External USB storage is:

Create subfolder with device name (TSG700558)

Create subfolder for each channel

File already exists:

 If a conflict is reported regarding the Automatic file upload, click **Fix it** or go to the Automatic File Upload configuration page and disable automatic file upload or switch to a non-USB based upload type.

4. Insert your USB storage device into the USB port on Pearl Nano, then click **Recording** from the Channel menu in the Admin panel. The Recording page opens.
5. Check the files you want to download and do one of the following:
 - a. Click **Copy Selected to external drive** to copy the files to the USB drive.
 - b. Click **Move Selected to external drive** to move the files and delete them off of Pearl Nano.

In this example, the first file is currently recording and cannot be downloaded.

Recorded Files

Internal Storage

		End	Duration	File Size		
Feb 14	D2P85606_v	14:11:11	27 seconds	0.25 MB		
<input type="checkbox"/>	D2P85606_video_Feb14_11-30-32.avi	11:30:32	11:30:50	18 seconds	0.18 MB	
<input type="checkbox"/>	D2P85606_video_Feb14_11-30-20.avi	11:30:20	11:30:32	12 seconds	0.11 MB	

To download or move files, select them and click the appropriate button.

6. Follow the steps to Safely eject USB storage device when you're done.

View file transfer to USB device status and cancel using the Admin panel

During a file transfer to an External USB drive, you can monitor the file transfer progress and cancel the file transfer using the Admin panel. You can only cancel the transfer of a file while it is in progress.

For other options to view the USB file transfer progress, see [View AFU and file transfer progress](#).

1. While the file transfer is in progress, select **External USB Drive** link from the Configuration menu in the Admin panel. The External USB Drive configuration page opens.
2. View the current file transfer status under the **Status** section. To cancel the current file transfer, select **Cancel** and confirm when prompted. The option to cancel only appears while the file transfer is in progress. The file that is highlighted in green is currently being transferred.

External USB drive

External USB storage is: used for one-time move/copy of the recorded files (upon insertion)

Maximum number of files to transfer: 100

Create subfolder with device name (900156)
 Create subfolder for each channel
 Remove after copying
 Mark file as downloaded
 Ignore already downloaded files

File already exists: replace

Apply

Status

Processed 2 files from 10
 Processed 84.8 MB from 251.6 MB
 Estimated time: 8 seconds

	File Name	Start	End	Duration	File Size	Progress %	
2021 Feb 16	Auto_Feb16_10-00-18.mp4	15:00:18	15:00:54	36 seconds	24.9 MB	100	✕
	Auto_Feb16_08-29-56.mp4	13:29:56	13:30:53	57 seconds	40.8 MB	100	✕
	Auto_Feb16_08-15-01.mp4	13:15:01	13:18:24	03:23	143.2 MB	13	✕
2021 Feb 05	Auto_Feb05_08-11-30.mp4	13:11:30	13:11:55	25 seconds	18.2 MB	0	✕
	Auto_Feb05_08-09-13.mp4	13:09:13	13:09:19	6 seconds	4.1 MB	0	✕
2021 Feb 04	Auto_Feb04_07-35-09.mp4	12:35:09	12:35:11	2 seconds	1.9 MB	0	✕

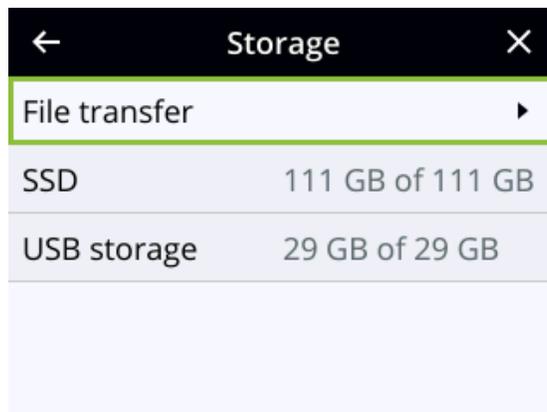
Cancel

View available USB storage space

When you insert a USB storage device into a USB port and select an **External USB Drive** action other than **ignored** (i.e. manual copy, automatic copy, etc), the total and free space are calculated and displayed in the Admin panel.

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

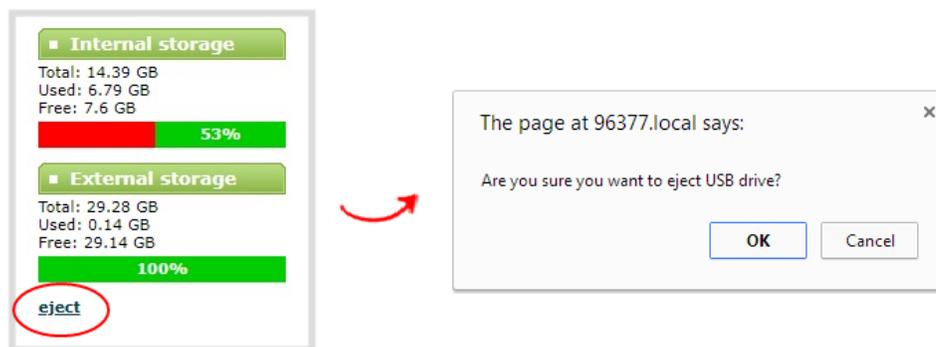
You can also view the storage capacity when you select **Storage** using the front screen menu. A USB storage device must be connected to see the USB storage listed.



Safely eject the USB storage device using the Admin panel

When you're done saving recordings to the USB storage device, you can safely eject it using the link at the bottom of the Admin panel page.

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. At the bottom of the menu panel, click **eject** and click **OK** when prompted.



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

One-time copy all recordings to USB storage device

When one-time move/copy of files is configured, the Pearl device automatically starts copying files as soon as you connect a USB storage device to the USB port.

Newest recordings are copied first. Files continue copying over until one of the following events occur:

- all files are copied
- the specified maximum number of files are copied
- the target drive runs out of storage space

File that are currently recording do not transfer until recording ends.

The following table describes the options available for a one-time move/copy of recordings to a USB storage device.

Table 67 One-Time Move/Copy File Transfer Options

Name	Description
create subfolder with serial number (<serial>)	If checked, the transfer process creates a sub-folder with the system’s serial number on the USB drive. This is useful if you are using the same drive to collect recordings from multiple systems and want to know which system they came from.
create subfolder for the channel	If checked, the transfer process creates a sub-folder for the channel into which the files are copied (within the subfolder for the serial number, if that option is also selected).
remove after copying	If checked, the file(s) are removed after being copied to the USB drive. Checking this box makes the transfer a move instead of a copy.
mark file as downloaded	If checked, the files that are downloaded are marked with a downloaded icon when viewing file lists. This has no effect if remove after copying is checked.
ignore already downloaded files	If checked, files that were previously downloaded or marked as downloaded are not included in subsequent downloads.



If your USB drive has no activity indicator to let you know when the transfer is complete, select the one-time move/copy option to **remove after copying** or **mark the file as downloaded** so that you know when the transfer has finished.

Prerequisites

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

Configure a one-time copy of all recorded files to a USB storage device using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).

2. From the Configuration menu, select **External USB Drive**. The External USB Drive configuration page opens.
3. Select **used for one-time move/copy of the recorded files (upon insertion)**.

External USB drive

External USB storage is: used for one-time move/copy of the recorded files (upon insertion) ▼

Maximum number of files to transfer: 100

Create subfolder with device name (900156)

Create subfolder for the channel

Remove after copying

Mark file as downloaded

Ignore already downloaded files

File already exists: replace ▼

Apply

 If a conflict is reported regarding the Automatic file upload settings, click **Fix it** or go to the Automatic File Upload configuration page and either disable automatic file upload or switch to a non-USB based upload type.

4. Check the options you want to use for the one-time move/copy file transfer and click **Apply**.
5. Insert the USB storage device into the USB port on Pearl Nano. File transfer starts automatically.
6. Follow the steps to [One-time copy all recordings to USB storage device](#) when the activity light on the USB storage device stops flashing. If your USB device doesn't have activity indicators:
 - a. Check the **Recording** list for the channel to verify if there are files that have yet to be copied.
 - b. [One-time copy all recordings to USB storage device](#) when you are satisfied all files have been copied, or if you notice the USB storage device is out of space, see [One-time copy all recordings to USB storage device](#).

Manually copy recordings to USB

You can manually copy recordings to a USB storage device that is connected to Pearl Nano. This procedure is separate from automatic file upload and does not need any pre-configuration in the automatic file upload page.

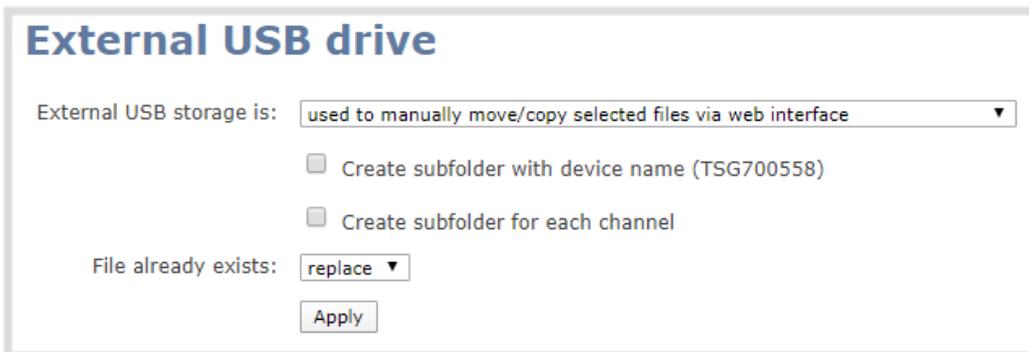
The following table describes the options available when manually copying recordings to a USB storage device.

Table 68 One-Time Move/Copy File Transfer Options

Name	Description
create subfolder with serial number (<serial>)	If checked, the transfer process creates a sub-folder with the system’s serial number on the USB drive. This is useful if you are using the same drive to collect recordings from multiple systems and want to know which system they came from.
create subfolder for the channel	If checked, the transfer process creates a sub-folder for the channel into which the files are copied (within the subfolder for the serial number, if that option is also selected).
File already exists	Choose the action to take if a file with the same name already exists in the copy location: <ul style="list-style-type: none"> • replace (default) • skip • rename

Manually copy recorded files to a USB device using the Admin panel

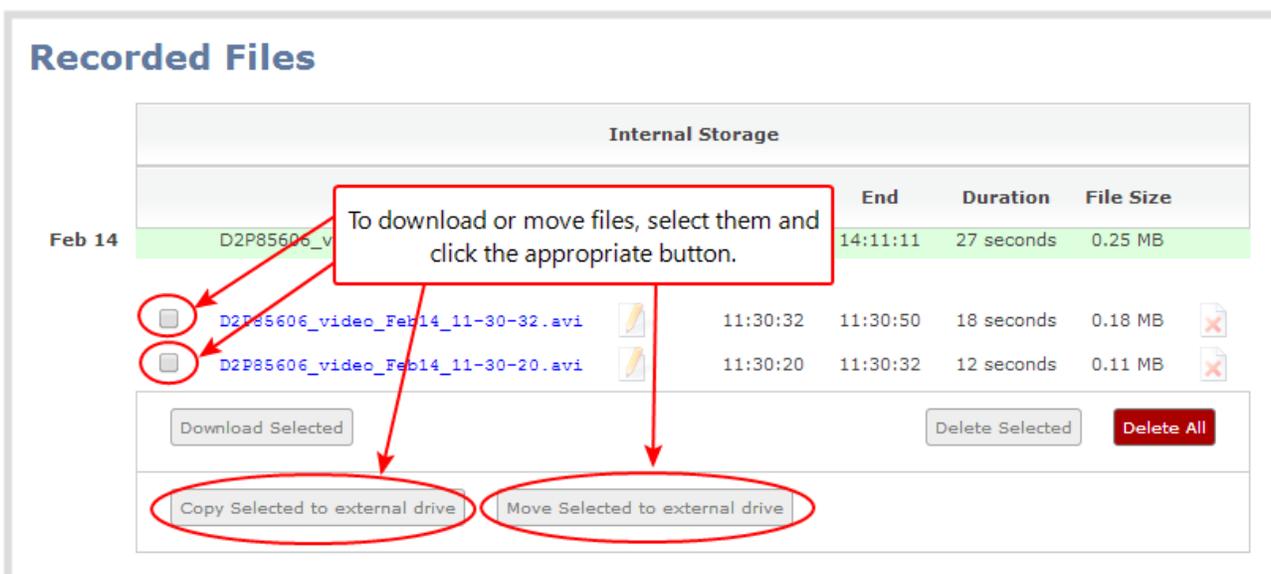
1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **External USB Drive link**. The External USB Drive configuration page opens.
3. Select **used to manually move/copy selected files via the Admin panel** and click **Apply**.



 If a conflict is reported regarding the Automatic file upload, click **Fix it** or go to the Automatic File Upload configuration page and disable automatic file upload or switch to a non-USB based upload type.

4. Insert your USB storage device into the USB port on Pearl Nano, then click **Recording** from the Channel menu in the Admin panel. The Recording page opens.
5. Check the files you want to download and do one of the following:
 - a. Click **Copy Selected to external drive** to copy the files to the USB drive.
 - b. Click **Move Selected to external drive** to move the files and delete them off of Pearl Nano.

In this example, the first file is currently recording and cannot be downloaded.



Recorded Files

		End	Duration	File Size		
Feb 14	D2P85606_v	14:11:11	27 seconds	0.25 MB		
<input type="checkbox"/>	D2P85606_video_Feb14_11-30-32.avi	11:30:32	11:30:50	18 seconds	0.18 MB	
<input type="checkbox"/>	D2P85606_video_Feb14_11-30-20.avi	11:30:20	11:30:32	12 seconds	0.11 MB	

Buttons: Download Selected, Delete Selected, Delete All, Copy Selected to external drive, Move Selected to external drive

6. Follow the steps to Safely eject USB storage device when you're done.

View file transfer to USB device status and cancel using the Admin panel

During a file transfer to an External USB drive, you can monitor the file transfer progress and cancel the file transfer using the Admin panel. You can only cancel the transfer of a file while it is in progress.

For other options to view the USB file transfer progress, see [View AFU and file transfer progress](#).

1. While the file transfer is in progress, select **External USB Drive** link from the Configuration menu in the Admin panel. The External USB Drive configuration page opens.

- View the current file transfer status under the **Status** section. To cancel the current file transfer, select **Cancel** and confirm when prompted. The option to cancel only appears while the file transfer is in progress. The file that is highlighted in green is currently being transferred.

External USB drive

External USB storage is: used for one-time move/copy of the recorded files (upon insertion)

Maximum number of files to transfer: 100

Create subfolder with device name (900156)
 Create subfolder for each channel
 Remove after copying
 Mark file as downloaded
 Ignore already downloaded files

File already exists: replace

Apply

Status

Processed 2 files from 10
 Processed 84.8 MB from 251.6 MB
 Estimated time: 8 seconds

	File Name	Start	End	Duration	File Size	Progress %	
2021 Feb 16	Auto_Feb16_10-00-18.mp4	15:00:18	15:00:54	36 seconds	24.9 MB	100	✘
	Auto_Feb16_08-29-56.mp4	13:29:56	13:30:53	57 seconds	40.8 MB	100	✘
	Auto_Feb16_08-15-01.mp4	13:15:01	13:18:24	03:23	143.2 MB	13	✘
2021 Feb 05	Auto_Feb05_08-11-30.mp4	13:11:30	13:11:55	25 seconds	18.2 MB	0	✘
	Auto_Feb05_08-09-13.mp4	13:09:13	13:09:19	6 seconds	4.1 MB	0	✘
2021 Feb 04	Auto_Feb04_07-35-09.mp4	12:35:09	12:35:11	2 seconds	1.9 MB	0	✘

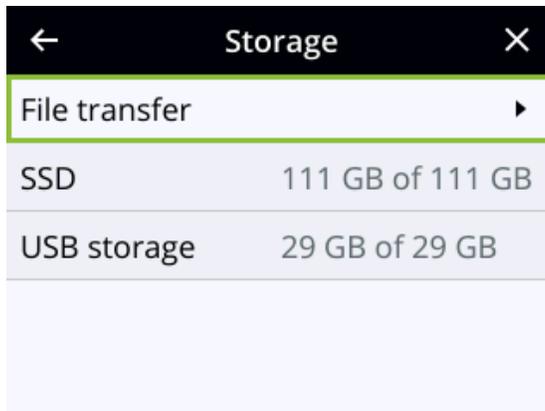
Cancel

View available USB storage space

When you insert a USB storage device into a USB port and select an **External USB Drive** action other than **ignored** (i.e. manual copy, automatic copy, etc), the total and free space are calculated and displayed in the Admin panel.

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

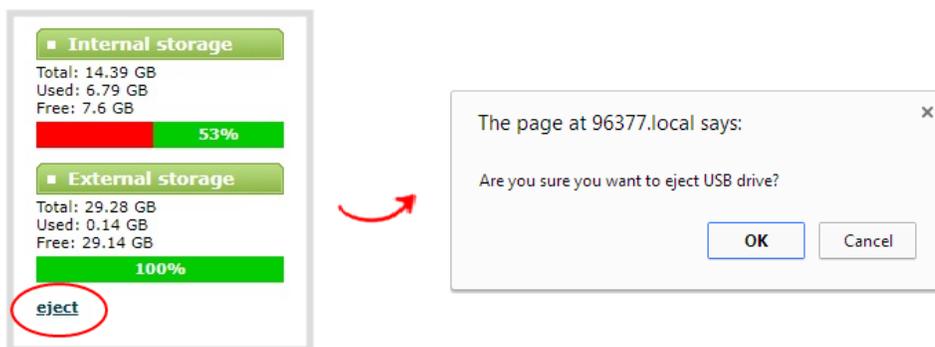
You can also view the storage capacity when you select **Storage** using the front screen menu. A USB storage device must be connected to see the USB storage listed.



Safely eject the USB storage device using the Admin panel

When you're done saving recordings to the USB storage device, you can safely eject it using the link at the bottom of the Admin panel page.

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. At the bottom of the menu panel, click **eject** and click **OK** when prompted.



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

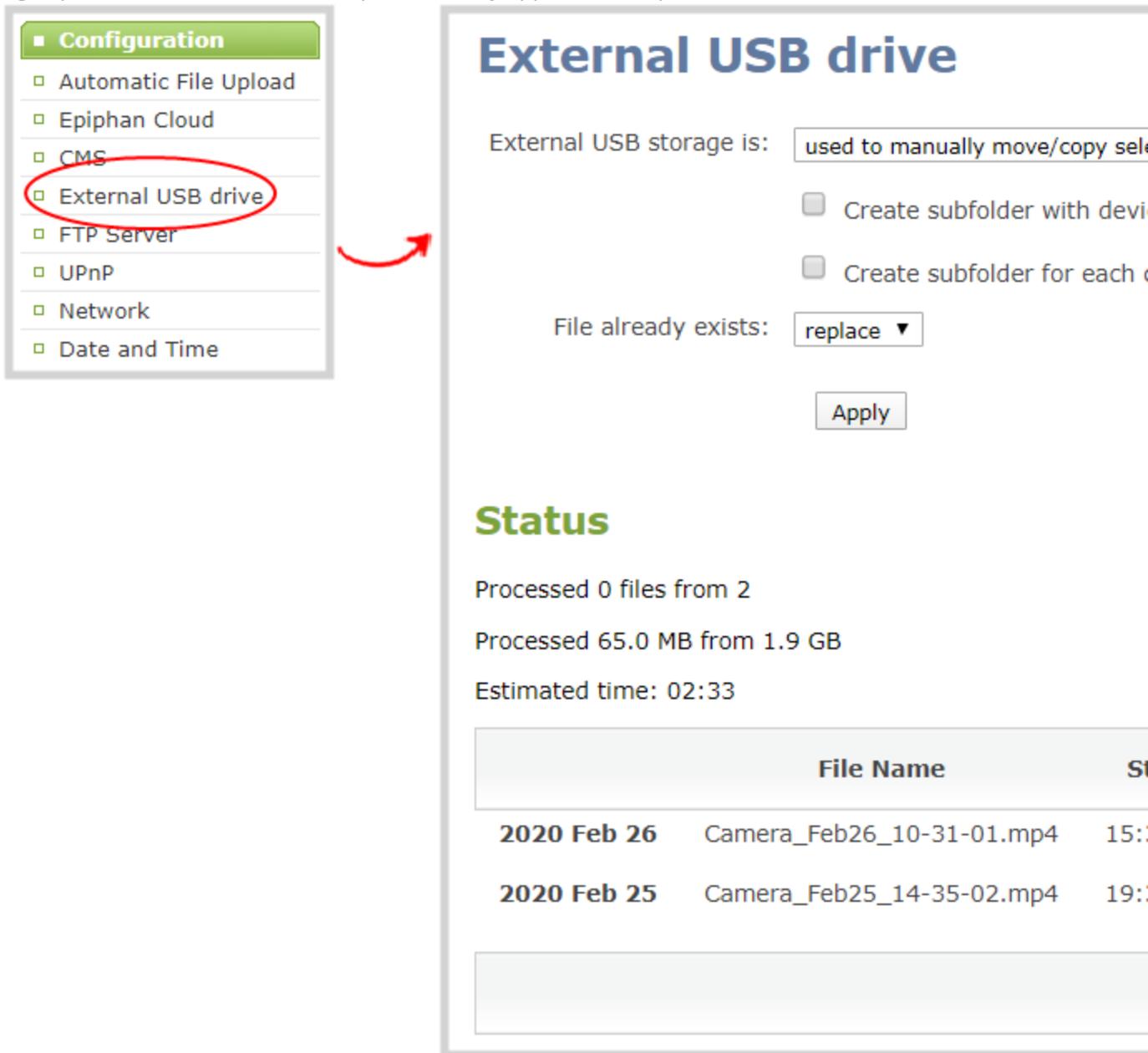
Manage USB file transfer queue

You can view USB file transfer information, delete files in the USB file transfer queue, and cancel USB file uploads using the Admin panel.

Information such as the file name and size, start time, duration, and progress are displayed. A history of file transfers displays until either Pearl Nano is restarted or the list is manually cleared. External USB storage must be configured for the USB file transfer status to display.

View USB file transfer status, delete files in the queue, or cancel file uploads using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **External USB Drive**. The External USB Drive configuration page opens. If there are files to be uploaded, they appear in the queue.



3. To remove a file from the USB transfer queue, click X beside the file you want to remove.

- 4. To cancel the current USB file transfer that's in progress and remove all files that are currently waiting in the USB transfer queue, click **Cancel**.

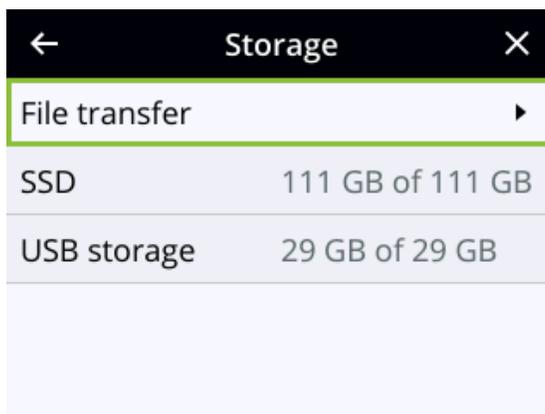
Manage USB drive

View available USB storage space

When you insert a USB storage device into a USB port and select an **External USB Drive** action other than **ignored** (i.e. manual copy, automatic copy, etc), the total and free space are calculated and displayed in the Admin panel.

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

You can also view the storage capacity when you select **Storage** using the front screen menu. A USB storage device must be connected to see the USB storage listed.

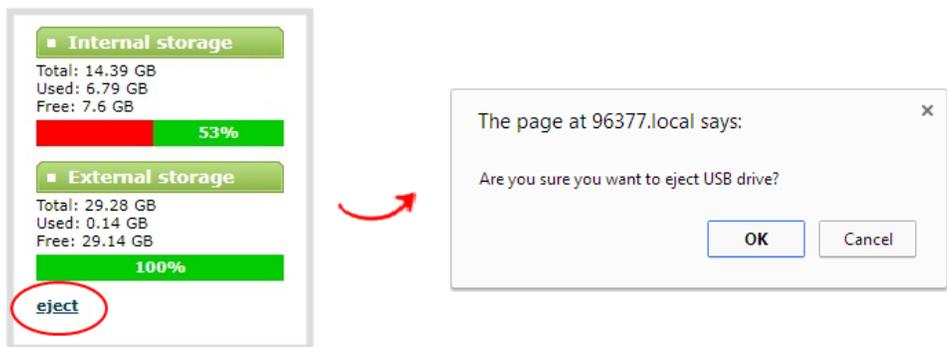


Storage	
File transfer	
SSD	111 GB of 111 GB
USB storage	29 GB of 29 GB

Safely eject the USB storage device using the Admin panel

When you're done saving recordings to the USB storage device, you can safely eject it using the link at the bottom of the Admin panel page.

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. At the bottom of the menus panel, click **eject** and click **OK** when prompted.



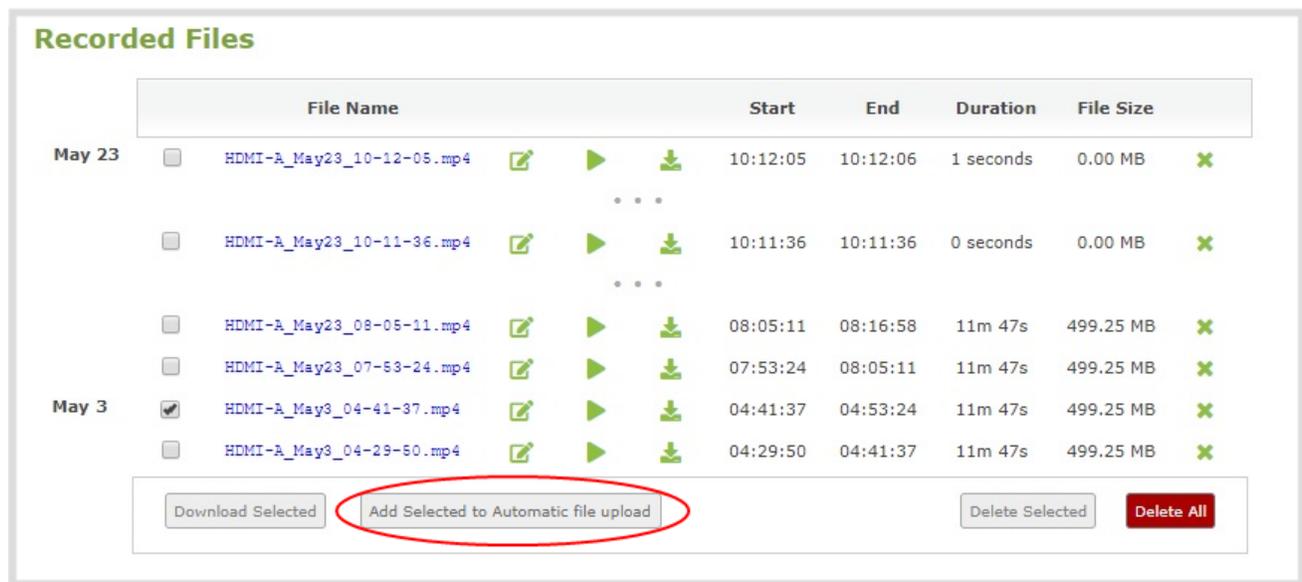
It's now safe to disconnect the USB storage device from the Pearl device.

Add recordings to an AFU queue

You can add previously recorded files to an AFU queue using the Admin panel. Before you can add a previously recorded file, the channel must be enabled for AFU and at least one new recording must have been queued.

Add an existing recording to an AFU queue using the Admin panel

1. Login to the Admin panel as **admin** or **operator**, see [Connect to the Admin panel](#).
2. Find the recordings by channel or by recorder and select the files you want to add to the AFU queue.
3. Select **Add Selected to Automatic file upload**.



The screenshot shows the 'Recorded Files' interface. It features a table with columns for 'File Name', 'Start', 'End', 'Duration', and 'File Size'. The table lists several recordings, with the date 'May 23' and 'May 3' grouped. Each row includes a checkbox, a file name, and icons for edit, play, and download. At the bottom, there are four buttons: 'Download Selected', 'Add Selected to Automatic file upload' (circled in red), 'Delete Selected', and 'Delete All'.

	File Name	Start	End	Duration	File Size
May 23	<input type="checkbox"/> HDMI-A_May23_10-12-05.mp4	10:12:05	10:12:06	1 seconds	0.00 MB
	<input type="checkbox"/> HDMI-A_May23_10-11-36.mp4	10:11:36	10:11:36	0 seconds	0.00 MB
	<input type="checkbox"/> HDMI-A_May23_08-05-11.mp4	08:05:11	08:16:58	11m 47s	499.25 MB
May 3	<input type="checkbox"/> HDMI-A_May23_07-53-24.mp4	07:53:24	08:05:11	11m 47s	499.25 MB
	<input checked="" type="checkbox"/> HDMI-A_May3_04-41-37.mp4	04:41:37	04:53:24	11m 47s	499.25 MB
	<input type="checkbox"/> HDMI-A_May3_04-29-50.mp4	04:29:50	04:41:37	11m 47s	499.25 MB

View the AFU log

A log is kept of automatic file uploads. You can view the AFU log using the Admin panel. If you want to view the AFU status, see [View AFU and file transfer progress](#).

View the AFU log using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Automatic File Upload**. The Automatic File Upload configuration page opens.
3. Click **Show log of automatic file upload**. The log page opens. If no logs are present, the page is blank.
4. Click the browser's back button when you are done.

Manage the AFU queue

The Automatic File Upload (AFU) queue displays a list of recorded files waiting to be uploaded. You can view the AFU queue and remove files from the queue using the Admin panel. Automatic File Transfer must be configured for the AFU queue to display.

For other options to view AFU and file transfer progress, see [View AFU and file transfer progress](#).



Emptying the AFU queue does not cancel an AFU transfer.

View the AFU queue and remove files from the queue using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Automatic File Upload**. If there are files to be uploaded, they appear in the queue.
3. To remove a file from the AFU queue, click **X** beside the file you want to remove.
4. To remove all files that are currently waiting in the AFU queue, click **Empty Queue**.

Integration

Pearl Nano is fully integrated with Kaltura, Panopto, YuJa, and Opencast Content Management Systems (CMS). Learn to use the Admin panel to set up and manage your Pearl device with these Content Management Systems, as well as how to record and stream.

Topics include:

- [Kaltura registration](#)
- [Disable or deregister from Kaltura](#)
- [Kaltura recording and webcasting setup](#)
- [Panopto registration](#)
- [Disable CMS and disconnect from Panopto](#)
- [Panopto recording and webcasting setup](#)
- [CMS recording and webcasting control](#)
- [YuJa setup](#)
- [Opencast registration](#)
- [Disable CMS and disconnect from Opencast](#)
- [Opencast recording and streaming setup](#)

For information about using the Pearl device REST API, see: [Pearl System REST API Guide](#).

For information about using the Pearl device Legacy RS-232 and HTTP/HTTPS APIs, see: [Pearl System Legacy RS-232/HTTP API Guide](#).

Kaltura registration

The Pearl Nano is fully integrated with Kaltura Content Management Systems (CMSs) for a seamless video recording and webcasting experience. After it is registered, it appears as a resource in Kaltura's MediaSpace and can be selected for scheduled recordings and webcasts, as well as be used for unscheduled ad hoc events that you can create using the Admin panel (or from Pearl-2 and Pearl Mini's touch screen). Registering it as a resource with the Kaltura Content Management System (CMS) only needs to be done once.

Topics include:

- [Enable CMS and register with Kaltura](#)
- [Disable or deregister from Kaltura](#)
- [Change the resource name used for Kaltura](#)
- [Reassign a registered resource](#)

After Kaltura is registered, proceed to check the VOD and webcasting event settings and set up authentication for ad hoc events. See [Kaltura recording and webcasting setup](#).

Enable CMS and register with Kaltura

When CMS is enabled, use the Admin panel to register Pearl Nano as an encoder resource for Kaltura. After Pearl Nano is registered, you can assign it a unique name that appears in the list of resources when creating an event in Kaltura's MediaSpace. The default name includes the serial number of Pearl Nano to ensure the name is unique.

If more than two other resources are already registered with the same name, you're prompted to choose a different name and try to register Pearl Nano again. If only one resource is registered with the same name, you're prompted to take over the events for that other resource. If you do, Kaltura transfers all scheduled events from that other device over to Pearl Nano. For more information, see [Reassign a registered resource](#).

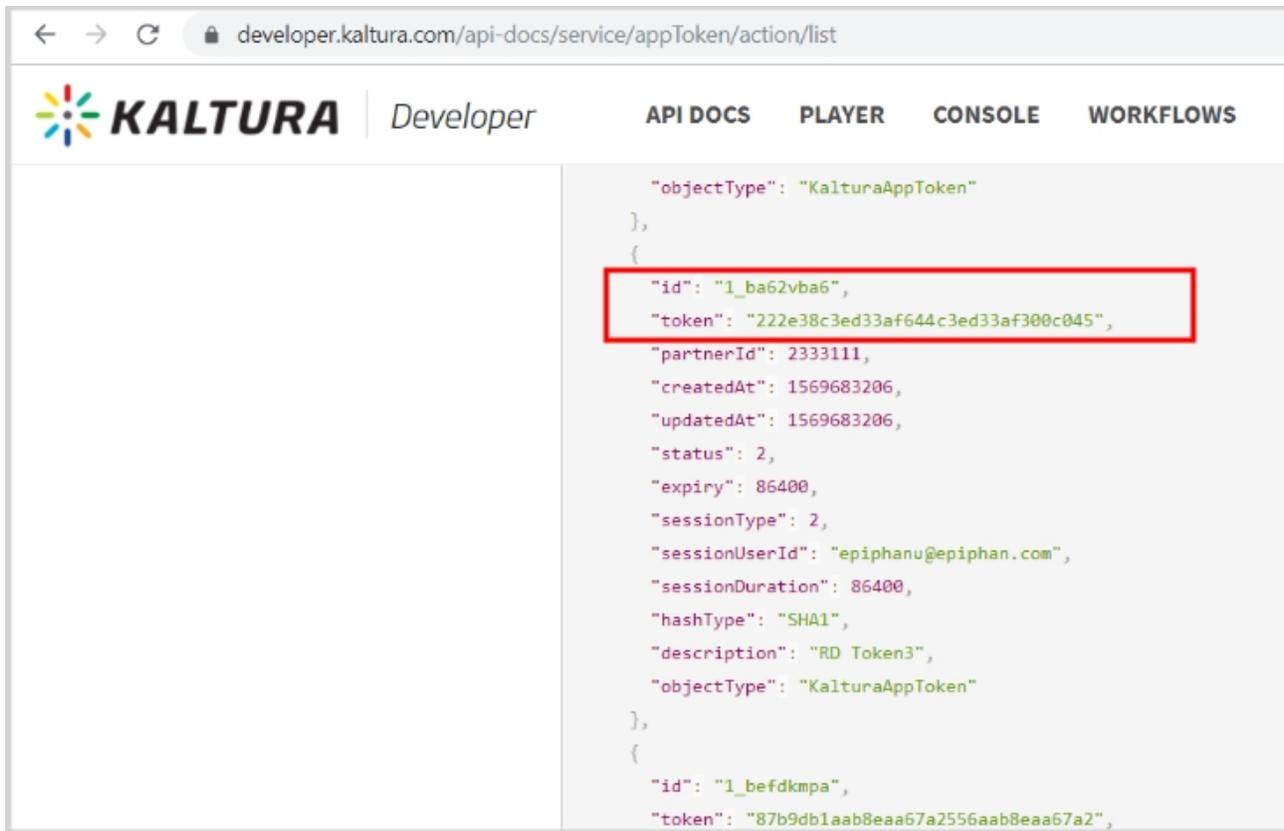


It may take some time for Kaltura to display a newly registered resource, depending on how busy the Kaltura system is when you register.

There are two methods to register your Pearl Nano:

- Using your Kaltura partner ID and administrator secret
- Using an application token and the token ID

A [Kaltura application token](#) can be created from the Kaltura developer website: www.developer.kaltura.com



There are two types of Kaltura application tokens you can use with Pearl Nano: an administrative session type and a user session type. With an administrative session token, Pearl Nano uploads event recordings to the respective event owner's account in Kaltura as expected.

A user session token requires the following permissions:

```

KMC_ACCESS,KMC_READ_ONLY,BASE_USER_SESSION_PERMISSION,WIDGET_SESSION_PERMISSION,CONTENT_INGEST_BASE,CONTENT_INGEST_UPLOAD,CONTENT_MANAGE_BASE,cuePoint.MANAGE,CONTENT_MANAGE_SCHEDULE,CAPTURE_DEVICE_PERMISSION,CONTENT_INGEST_REFERENCE_MODIFY,disableentitlement

```

Important considerations for user session application tokens

- Pearl Nano uploads all events (scheduled and ad hoc) to the user account ID associated with the user token.
- All event recordings (scheduled and ad hoc) upload to the Kaltura account of the user who created the event if there is no user ID associated with the token.

- Do not include a creation date for the user session token. A creation date in the token causes Pearl Nano to upload events only to the token creator. .

Before you begin, you should already have:

- A Kaltura instance created
- Either of the following:
 - Your Kaltura partner ID and administrator secret
 - Your application token ID and token value

Enable Pearl Nano as a resource and register with Kaltura using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. From the **Choose CMS** drop down, select **Kaltura** and then click **Apply**.
4. In the Authorization method field, select the authorization method and do one of the following:
 - a. If you select **Administrator secret**, enter your Kaltura **Partner ID** and **Administrator secret** that you got from Kaltura.
 - b. If you select **Application token**, enter the application **Token ID** and **Token value** .



Ensure the **Token hash type** matches the hash type set in the application token. The default is **SHA1**.

5. (Optional) Change the **Resource name** that appears for this device in Kaltura. The default resource name includes the serial number of Pearl Nano.
6. Click **Register device**.

An Events screen is added to Pearl Nano's front screen. Press the **left arrow** key on the control key interface until you see the Events screen display. This is where you can see a list of scheduled Kaltura events for your Pearl Nano device.

What's next

Choose which Pearl Nano channels you want this resource to record, assign the channel to use for web-casting, setup authentication for ad hoc events, and specify default ad hoc event parameters. See [Kaltura recording and webcasting setup](#). Pearl Nano only has a single channel.

Disable or deregister from Kaltura

You can disable CMS using the Admin panel and still select Pearl Nano as a resource using Kaltura MediaSpace. However, the events schedule won't synchronize on Pearl Nano and any events that are scheduled to start while CMS is disabled do not start on Pearl Nano. If CMS is re-enabled on Pearl Nano before the event is scheduled to end, that event will start automatically after the events schedule is refreshed on Pearl Nano, see [View scheduled CMS events and history](#).

Existing events that are already associated with the device do not lose their association when CMS is disabled. As soon as you re-enable Kaltura CMS on Pearl Nano, you can record and stream events as usual. CMS is disabled by default.

Deregistering removes Pearl Nano from Kaltura's list of resources and any existing events that were associated with that resource lose their association. You must select a new resource for those events using MediaSpace.



Content Management Systems (CMSs) can change channel settings automatically. After disabling CMS on Pearl Nano, check your channel settings or apply a configuration preset to restore your channel to known values.

Important considerations

- You cannot start ad hoc (manual) Kaltura events when CMS is disabled or when Pearl Nano has been deregistered.
- When CMS is disabled or Pearl Nano is deregistered, existing scheduled events that are associated with the device do not record or stream.
- If Pearl Nano is deregistered, existing events associated with that device lose the association. You must select a new resource for those events.
- Ensure the deregistered Pearl Nano entry in the list of encoder devices on Kaltura disappears before registering again if using the same device name.
- Do not disable CMS while an event is in progress.



After disabling or deregistering from Kaltura, the recording file size limit for the channels reset to 64 GB. Check to ensure this value does not exceed the maximum recording space allowed for the installed SD card and change the value to avoid unintentionally overwrite existing recordings. For more information about setting the recording file size limit, see [Disable or deregister from Kaltura](#).

Disable Pearl Nano as a resource or deregister from Kaltura using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. To disable CMS, select **none** from the **Choose CMS** drop down and then click **Apply**.
4. To deregister Pearl Nano, click **Deregister device**.

Change the resource name used for Kaltura

Using the Admin panel, you can change the resource name that's assigned to Pearl Nano while it's registered with Kaltura.

Each Pearl Nano is assigned a unique resource name that includes the serial number of the device by default. You can transfer scheduled VOD and scheduled webcasting events from one resource to another by assigning Pearl Nano the same resource name as another resource.

When a resource with the same name is already registered in Kaltura, a warning message appears when you try to apply the new resource name to Pearl Nano.

- If there's only one other registered resource with that name, you're prompted to choose whether or not to take over the events for that other resource. If you do take them over, Kaltura transfers all scheduled events from that other device over to Pearl Nano.
- If more than two other resources are already registered with the same resource name in Kaltura, the name change fails. You're prompted to choose a different resource name and try again.

Change Pearl Nano resource name using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. Change the **Resource name** and click **Apply**.

Reassign a registered resource

Every encoder you register with Kaltura has a unique resource name. To swap out one Pearl Nano with another one, you can simply reassign the existing Pearl Nano resource name to the replacement Pearl Nano.

Assigning Pearl Nano the same resource name when you register the encoder transfers all the existing schedules and recordings over to the replacement Pearl Nano. When a resource tries to register using the same name as another device, a warning message appears and you're asked whether or not you want to take over from the other resource.

- If there's only one other registered resource with that name, you're prompted to choose whether or not to take over the events for that other resource. If you do take them over, Kaltura transfers all scheduled events from that other device.
- If more than two other resources are already registered with the same resource name in Kaltura, registration fails. You're prompted to choose a different resource name and to try registering Pearl Nano again.

This works well when you want to change the encoder in a room but retain all the existing schedules and recordings that are associated with the encoder for that room.

Alternatively, you can avoid having to register the replacement Pearl Nano with Kaltura. If you apply a configuration preset to set up the replacement Pearl Nano with the settings from the currently registered Pearl Nano, the replacement Pearl Nano assumes the identity of the registered resource. For more information about configuration presets, see [About configuration presets](#).



Using a configuration preset can result in two Pearl Nano resources with the same identity, which can effect recording and the content that's uploaded to Kaltura for scheduled events. Power down, disconnect from the network, and consider performing a factory reset on one of the Pearl Nano resources to remove the possibility of having duplicate resources.

If you've performed a factory reset that resulted in an orphaned Kaltura resource registration, you can perform this procedure to reregister your Pearl Nano using the same resource name to take over the resource instance that is still registered in Kaltura.

Before you begin, you should already have:

- A Kaltura instance created
- Access to the Kaltura Management Console (KMC)
- Your Kaltura partner ID
- Your Kaltura administrator secret

Enable Pearl Nano as a resource and register with an existing resource name using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. From the **Choose CMS** drop down, select **Kaltura** and then click **Apply**.
4. Enter your **Partner ID** and **Administrator secret** that you got from Kaltura.
5. Change the **Resource name** to the resource name of the Pearl Nano you are replacing and click **Register device**.
6. When you're prompted to take over the events from the existing resource with that same name, click **Yes**.

Kaltura recording and webcasting setup

Your Pearl device appears as an available resource as soon as the device is registered with Kaltura. Connect multiple audio and video sources directly to the Pearl device and assign them to separate channels. Each channel you configure on the Pearl device is treated as a separate video source.



The channel you set up on Pearl Nano is treated as a single video source.

For more information about using the auto channel feature, creating channels or using custom layouts, see [What is a channel?](#).

Topics include:

- [About Kaltura recording and webcasting](#)
- [Kaltura settings](#)
- [Set up channel for Kaltura VOD events on Pearl Nano](#)
- [Set up channel and URLs for Kaltura webcasting events](#)
- [Set Kaltura ad hoc event parameters](#)
- [Set the extend Kaltura CMS event interval](#)
- [Change the events schedule refresh interval](#)
- [Use RTMPS for a Kaltura webcasting event](#)

About Kaltura recording and webcasting

Pearl Nano supports scheduled events, recurring events, and unscheduled ad hoc recordings and webcasts. After the Pearl device is registered, Kaltura users can simply assign the Pearl device as a resource when setting up an event using MediaSpace.

Scheduled events start and end automatically. No manual intervention is required. After the event ends, the recording automatically uploads. Back up recordings for each channel are also saved locally on the Pearl device.



Pearl Mini and Pearl Nano - An SD card must be installed to record events. We recommend using large capacity SD cards such as 256 GB with a CMS.(Pearl Nano can also use a large capacity SATA M.2 2280 SSD when using Pearl Nano)

If the network connection or the CMS goes down during an event, the Pearl device continues to record locally and uploads the recording when network connectivity resumes. Depending on how busy the Kaltura CMS system is when the files upload, it may take some time for the files to appear in Kaltura's media lists.

You can start and stop events earlier than the scheduled time using the Admin panel or the device screen.



Starting or stopping a scheduled VOD event before the scheduled start or stop time does not change the event in to an ad hoc event.

Pearl administrators can:

- Create ad hoc events, see [Create ad hoc events using the Admin panel](#).
- Set ad hoc event parameters.
- View the Events page to see all upcoming scheduled sessions and completed sessions, see [View scheduled CMS events and history](#).
- Change how often Pearl Nano polls Kaltura for an updated list of Events.
- Download local recordings for each channel, see [Recover channel backup recordings](#).
- Start and stop scheduled events before the scheduled time, see [Start/stop scheduled CMS events using the Admin panel](#).
- Extend scheduled events, see [Extend or pause CMS recordings and webcasts](#).
- Change the extend event button time allotment in 5, 10, and 15 minute intervals, see [Set the extend Kaltura CMS event interval](#).

General information

- The Pearl Nano must be registered with Kaltura to record and stream Kaltura events, see [Enable CMS and register with Kaltura](#).
- Scheduled events have priority over ad hoc events. If an ad hoc event is still in progress when it's time to start a scheduled event, the ad hoc event is stopped and the scheduled event starts.
- Scheduled events automatically start recording locally on the Pearl device even if the network is down or Kaltura is unavailable. After the session ends, the locally recorded files upload automatically to your Kaltura media list when the network link to Kaltura is re-established.
- After the event ends, it may take a while for content to show up in Kaltura's media lists, depending on how busy the Kaltura CMS system is at that time.
- The recorded event must be a minimum of 2 minutes long for Kaltura to process the video.
- The Kaltura Editor does not open recorded events that are less than a minute long.
- If the network connection is lost during a file upload to Kaltura, the transfer automatically restarts when the network connection re-establishes.
- If the Pearl device loses power while a scheduled event is being recorded, the recording stops. If the Pearl device is powered back on before the scheduled end time for the event, recording of the scheduled event restarts automatically and a second set of files are created. When the event ends, both files automatically upload to Kaltura.
- If the Pearl device was unavailable on the network or powered down and misses a scheduled event, the status of that event appears as **Skipped** on the Events page in the Admin panel.
- If the time and zone settings of the Pearl device are out of synchronization with Kaltura's scheduling server, an error appears on the Events page and you're prompted to reconfigure the time settings on the Pearl device, see [Configure date and time](#).
- Do not use AFU or configure recording file size, type and other channel recording settings when CMS is enabled on Pearl Nano.
- If you modify a particular recurring lecture capture plus live webcasting event (e.g. a VOD + Live Stream event in a recurring series), Kaltura excludes that event from the recurring series and the webcast doesn't stream. That's because the RTMP URLs for the modified event loses its mandatory tokens. However, the recurring Kaltura event does record as scheduled and other events in the series are not affected.

Workarounds: To regenerate the RTMP tokens for a live event, go to MediaSpace, find the modified live event entry and uncheck the Live event checkbox - and save. Then re-check it and save the event again. Alternatively, you can go to the Kaltura Management Console (KMC), find the modified live event entry and then, in the Live stream tab, click **Re-generate Stream Token**.

- Do not schedule recordings that are longer than the capacity of Pearl Nano to store the recording on the local drive.



Default Kaltura encoding settings are applied automatically to the channel when Kaltura is enabled, which override the existing encoding settings. If you manually change the encoding settings using the Admin panel after Kaltura is enabled, the settings revert back to the default Kaltura settings when a scheduled or ad hoc event starts.

Pearl Nano information

Kaltura treats the channel you setup on Pearl Nano as a single video-source event for VODs and webcasts. The event recording is uploaded to Kaltura and appears as a single entry in the Kaltura media list. The name of the uploaded recording includes the name of the channel plus the date and time the file was recorded. For example: **Channel 1_May23_10-12-05**

For more information on using the front screen of Pearl Nano to start and stop events, see [Stop/start scheduled CMS events using Pearl Nano's front screen menu](#).

With Pearl Nano, you can:

- Deselect the Pearl Nano channel so that it cannot be displayed as the main default view when watching the VOD in Kaltura.
- Display the Channel view on Pearl Nano's front screen, see [Confidence monitoring using the front screen](#). You can also monitor the channel using the Admin panel.

Kaltura settings

The following list of features is available once your Pearl device has been registered with Kaltura.

VOD event channels

- **Channel** - Select a channel for VOD.
- **Enabled** - Select to enable the channel.
- **Main entry** - Select which channel will be the main entry (only one can be selected).

Live-stream event channel

- **Channel** - Select a channel to be live-streamed.
- **Secure streaming** - Select to send an RTMPS (instead of RTMP) stream.

- **Backup stream** - Select to enable a backup stream, then select the **Ad hoc event backup stream** from the dropdown list.
- **Ad hoc event primary stream** - Select a primary stream. If **Auto** is the only available option, then no additional streams are configured for the channel.
- **Ad hoc event backup stream** - Once Backup stream has been enabled, select a backup stream. If **Auto** is the only available option, then no additional streams are configured for the channel.

Unscheduled ad hoc event details

- **Session title** - Assign a default title for ad hoc events. Default variables specify the current date and time as the title using the format **yyy-mm-dd hh:mm**. This default title can be changed when an ad hoc event is created.
- **Event owner** - Assign an owner to ad hoc events created using the Pearl device.
- **Owner suffix** - Enter a suffix to be automatically applied to the Event owner field when users authenticate with Kaltura from the Pearl device. For example, if the owner account is *wilson@myorg.com*, enter the suffix *@myorg.com* here so that the user only needs to enter *wilson* to authenticate.
 - For Pearl Nano, you must authenticate from the Admin panel.
- **Description** - The description of the uploaded media that appears in Kaltura.
- **Tags** - Assign tags to the uploaded media for use by Kaltura. To assign multiple tags, separate the tags with a ",".
- **Categories** - Assign Kaltura categories to the uploaded media. To assign a nested category to the uploaded media, use the ">" symbol (with no spaces) between categories. To assign multiple categories, separate the categories with a ",". For example: Recordings>Tutorials>Biology1000, Recordings>Tutorials>Chemistry1000
- **Duration** - Assign a default duration for ad hoc events. This value can be changed when an ad hoc event is created.
- **Automatically logout** - Automatically logs out the ad hoc event creator when the ad hoc event ends. This is disabled by default.
 - For the Pearl-2 and Pearl Mini, automatic logout only works if the touch screen was used to create the ad hoc event.

Upload schedule

These settings are optional - they are not required for deployment.

- **File upload schedule** - Select the check box to enable scheduled file uploads.
- **Start upload** - Select a start time for file uploads

- **Stop upload** - Select a finish time for file uploads.

Click **Apply** when you have configured your upload settings.

Advanced

These settings are optional - they are not required for deployment.

- **Kaltura groups** -Provide Kaltura admin owner privileges to members of a Kaltura group for any Kaltura events created on this device. Now when you create a new event, you can select a Kaltura Group as an Admin owner, so the group will have Kaltura admin owner privileges to the uploaded file.



Pearl admin will only display groups created prior to this login session. If groups were created during the login session, log out and log in again to refresh the groups.

- **Kaltura monitoring dashboard** - Select to allow Pearl Nano to be visible in Kaltura's **My Dashboard**. For more information on Kaltura's **My Dashboard** feature, contact your Kaltura administrator.

Set up channel for Kaltura VOD events on Pearl Nano

Kaltura treats the channel on Pearl Nano as a single video-source event for scheduled and ad hoc VOD events.

After Pearl Nano is registered with Kaltura, the channel defaults should work for scheduled VOD events without further configuration. However, you can disable the channel for VOD events using the Admin panel. To set up ad hoc parameters, see [Set Kaltura ad hoc event parameters](#).



For information about how to customize the channel, see [Set up channel for Kaltura VOD events on Pearl Nano](#).

The channel is automatically set as the main entry, which is the default view that people see when they are watching. Adding VOD metadata and edits like trimming the VOD can be done later in Kaltura after the recording has uploaded.

Select channels for event views using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.



3. Under **VOD event channels**, uncheck **Enabled** to disable the channel for VOD events or leave it checked to enable using the channel for VOD events.
4. Click **Apply** at the bottom of the page.

Set up channel and URLs for Kaltura webcasting events

Pearl Nano's channel is automatically selected for scheduled and ad hoc webcasting events. However, you can choose to stream the event to the secondary backup stream URL using the Admin panel.

When a webcasting event is scheduled in Kaltura or started from Pearl Nano as an unscheduled ad hoc event, the stream URL and other event settings are sent to Pearl Nano. The Kaltura ingestion settings are applied automatically to Pearl Nano.

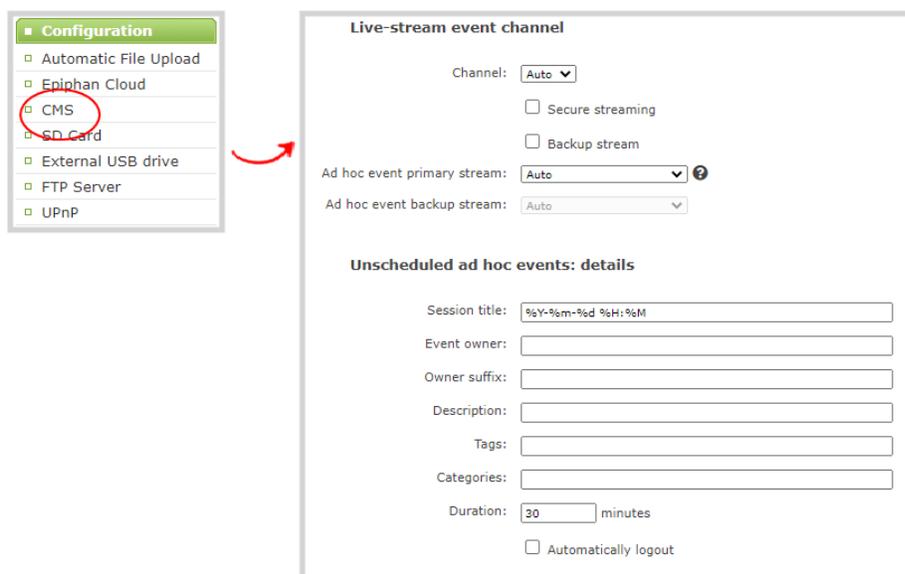
When you create a Kaltura webcasting event on Pearl Nano, you have the option to use the primary and backup URLs supplied by Kaltura for the stream or to choose a stream destination that is created locally for the channel on Pearl Nano. Alternative streaming destinations must already be configured for the channel being webcast. Select the **Auto** option to use the primary and backup URLs supplied by Kaltura. Auto is the default setting.

When it's time for the scheduled webcasting event to start, Pearl Nano automatically sends an RTMP (or RTMPS) stream to the primary URL associated with that event. If you've enabled the backup stream, Pearl Nano sends an RTMP stream to both the primary URL and the secondary backup URL associated with that event. If the primary URL stream fails for any reason, Kaltura automatically switches over to the backup URL.

Set up the channel and URLs for scheduled webcasting events using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.

3. Under the **Live-stream event channel** section, the channel is automatically selected. No further action is required. Optionally, you can select **None** to prevent Pearl Nano from webcasting the channel.
4. (Optional) Select an **Ad hoc event primary stream** from the drop-down list or select **Auto** to use the primary URL from Kaltura. If **Auto** is the only available option, then no additional streams are configured for the channel.
5. (Optional) Check **Backup stream** and select an **Ad hoc event backup stream** from the drop-down list. Select **Auto** to use the backup URL from Kaltura. If **Auto** is the only available option, then no additional streams are configured for the channel.
6. Click **Apply** at the bottom of the page.



Set Kaltura ad hoc event parameters

For ad hoc events, you can enter the metadata to associate with the uploaded media using the Admin panel. However, you can modify the metadata at any time using the Kaltura Management Console (KMC) after the content is uploaded.

Table 69 Kaltura ad hoc event parameters

Item	Description
Session title	This assigns a default title for ad hoc events. Default variables specify the current date and time as the title using the format yyy-mm-dd hh:mm . This default title can be changed when an ad hoc event is created.
Event owner	This assigns an owner to ad hoc events created using the Pearl device. The owner you enter here appears on the Login screen by default and can be overwritten when authenticating from Pearl-2 or Pearl Mini.
Owner suffix	Enter a suffix to be automatically applied to the Event owner field when users authenticate with Kaltura from the Pearl device (the Pearl Nano must use the Admin panel). For example, if the owner account is <i>wilson@myorg.com</i> , enter the suffix <i>@myorg.com</i> here so that the user only needs to enter <i>wilson</i> to authenticate.
Description	The description of the uploaded media that appears in Kaltura.
Tags	Assign tags to the uploaded media for use by Kaltura.
Categories	Assign Kaltura categories to the uploaded media. To assign a nested category to the uploaded media, use the ">" symbol (with no spaces) between categories. For example: Recordings>Tutorials>Biology1000 To assign multiple categories, separate the categories with a ",". For example: Recordings>Tutorials>Biology1000, Recordings>Tutorials>Chemistry1000
Duration	Assign a default duration for ad hoc events. This value can be changed when an ad hoc event is created.
Automatic logout	Automatically logs out the ad hoc event creator when the ad hoc event ends. This is disabled by default.

Important considerations

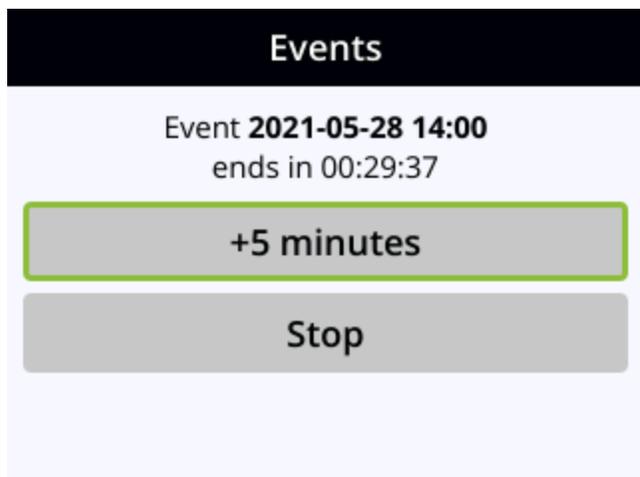
- Before you start recording, we recommend that you enter the event parameters you want associated with ad hoc events using the Admin panel. However, users can modify or add this metadata later using the Kaltura Management Console.
- CMS must be enabled and the Pearl device registered with Kaltura to create ad hoc events.

Set default ad hoc event parameters using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. Under **Unscheduled ad hoc events**, enter the information you want associated with this ad hoc event and click **Apply** at the bottom of the page.

Set the extend Kaltura CMS event interval

A button on the device screen lets users extend the length of an event that is in progress. By default, the event is extended in 5 minute intervals each time the button is tapped. Using the Admin panel, you can set the amount of time the event is extended to 5, 10, or 15 minute intervals. Events cannot be extended beyond the start of the next scheduled event.



Set the extend Kaltura CMS event interval using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu

opens.

3. Under **Advanced**, select the **Extend event** time interval from the drop down list and click **Apply**.

Change the events schedule refresh interval

Using the Admin panel, you can change how frequently to poll Kaltura for the latest event information to refresh the events listed on the Events page. The default interval is once every 3600 seconds (1 hour).



Requesting updated information too frequently can impact performance. We recommend setting an interval of no less than 120 seconds (once every 2 minutes). The longest interval supported is 604800 seconds (once a week).

Change how often Pearl Nano polls Kaltura for the latest event information

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. Under **Advanced**, enter the Schedule refresh interval in seconds or choose a value from the drop down list. Click **Apply** at the bottom of the page.

Use RTMPS for a Kaltura webcasting event

The Pearl Nano sends an RTMP stream to the primary URL associated with the webcasting event, or to both the primary URL and the secondary backup URL if you've enabled the backup stream. For more information, see:

- [Pearl Nano - Set up channel and URLs for Kaltura webcasting events](#).

You can configure Pearl device to send an RTMPS stream instead using the Admin panel.

Configure Pearl device to send an RTMPS stream using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. Under **Live-stream event channel**, check **Secure streaming** and click **Apply**.

Panopto registration

Pearl Nano is fully integrated with Panopto Content Management Systems (CMSs) for a seamless video recording and webcasting experience. After a simple registration process, Pearl Nano is available for your CMS users to select as a remote recorder resource or capture device for scheduled, recurring, and ad hoc events. Completed recordings automatically upload to the CMS. Registering Pearl Nano as a remote recorder for Panopto only needs to be done once.

Topics include:

- [Enable CMS and register with Panopto](#)
- [Disable CMS and disconnect from Panopto](#)

After Pearl Nano is registered, proceed to create URL redirects for Pearl Nano, setup authentication for ad hoc events, and select default settings. See [Panopto recording and webcasting setup](#).

Enable CMS and register with Panopto

Use the Admin panel to register Pearl Nano as a remote recorder for scheduled, recurring, and ad hoc recordings and webcasts. When you register Pearl Nano, a default name is assigned that includes the serial number of Pearl Nano. This name appears in the list of remote recorders in Panopto. You can change the remote recorder name using the Admin panel.

Before you begin, you need:

- Your Panopto service URL, for example: `https://<myorg>.hosted.panopto.com/`
- A Panopto-generated registration key for the remote recorder.
- The Epiphan API key from Panopto is required for on-premise versions of Panopto version 6 or earlier. Contact Panopto support for assistance to install the Epiphan API key.

Important considerations

- You create a registration key in Panopto from **System > Remote Recorders** when you click **Manage registration keys**. Record the key somewhere safe before closing the screen in Panopto. The key cannot be retrieved after the screen is closed. If you lose the registration key, you must create a new one to register Pearl Nano as a remote recorder.
- Scheduled recordings are associated to a remote recorder using the registration key and not the device name.

- If you disconnect Pearl Nano and register again using a different registration key, the scheduled sessions previously associated with the original key do not migrate over.
- If you're using the on-premise version of Panopto version 6 or earlier, you must manually add the API key for Pearl Nano. Contact Panopto support for assistance.
- If you are unable to register Pearl Nano, contact your Panopto administrator or Epiphan support.

Enable Pearl Nano as a remote recorder and register with Panopto using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration page opens.
3. From the **Choose CMS** drop down, select **Panopto** and then click **Apply**.
4. Enter the Panopto **Service URL**, **Registration key**, and optionally enter a **Device name** you want to appear in Panopto for this device, then click **Apply** at the bottom of the page. The Status updates to Connected.



Changing Panopto's device name for Pearl Nano does not change the name that is assigned to Pearl Nano in the Device info fields, see [Configure device info, name, description, and location](#).

What's next?

For Panopto, proceed to create URL redirects for Pearl Nano, setup authentication for ad hoc events, and select default settings. See [Panopto recording and webcasting setup](#).



An API client ID with two URL redirects are required to enable authentication on Pearl Nano, see [Set up Panopto authentication for ad hoc events](#).

Disable CMS and disconnect from Panopto

When you use the Admin panel to disable CMS on Pearl Nano, the remote recorder disconnects from Panopto. As long as Pearl Nano is still registered, you can create new scheduled sessions in Panopto for this remote recorder, but the events schedule won't synchronize until CMS is re-enabled.

If CMS is re-enabled on Pearl Nano before a VOD session is scheduled to end, recording starts automatically on Pearl Nano when the connection to Panopto is re-established. However, when the start

of a scheduled webcasting event is missed, the stream does not automatically start when the connection is re-established. A new webcasting event should be created.

Revoking the registration key and deleting Pearl Nano as a remote recorder is performed in Panopto, see Panopto's documentation for instructions. If you delete Pearl Nano in Panopto, all scheduled and recurring events that were associated with Pearl Nano are permanently deleted.



Content Management Systems (CMSs) can change channel settings automatically. After disabling CMS on Pearl Nano, it's good practice to check your channel settings or apply a configuration preset to restore your channel to known values.

Important considerations

- You cannot start unscheduled ad hoc events when CMS is disabled on Pearl Nano.
- Sessions that are scheduled to start while CMS is disabled on Pearl Nano do not start on Pearl Nano.
- Scheduled webcasting events do not start if Pearl Nano's connection to Panopto is not available.
- Deleting Pearl Nano in Panopto permanently deletes future scheduled and recurring sessions associated with that remote recorder.
- Do not disable CMS while an event is in progress.

Disconnect Pearl Nano from Panopto using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. To disconnect Pearl Nano, select **none** from the **Choose CMS** drop down and then click **Apply**.

Panopto recording and webcasting setup

Pearl Nano appears as an available resource as soon as the device is registered with Panopto. Pearl Nano also requires the channel is treated as a single video source. Next, set up authentication for ad hoc events to create ad hoc events from Pearl Nano.

For more information about channels, see [What is a channel?](#)

After that, you're ready to select video sources for multiple source recordings and webcasts. Video sources must be connected to Pearl Nano and assigned to a channel. Each channel configure on Pearl Nano is treated as a separate video source for multiple source events in Panopto.

Topics include:

- [About Panopto recording and webcasting](#)
- [Set up Panopto authentication for ad hoc events](#)
- [Set Panopto ad hoc event parameters](#)
- [Set the extend Panopto CMS event interval](#)
- [Enable mute and display image on pause](#)
- [Disable low disk space Panopto alerts](#)
- [Disable low disk space Panopto alerts](#)

About Panopto recording and webcasting

The Pearl Nano supports scheduled events, recurring events, and unscheduled ad hoc recordings and webcasts. Scheduled events start and end automatically. No manual intervention is required. After the event ends, recorded files automatically upload to the event owner's folder in Panopto. Backup recordings are also saved locally on Pearl Nano. If the network connection or the CMS goes down during an event, Pearl device continues to record locally and uploads the recording when network connectivity resumes.



Pearl Mini and Pearl Nano - A large capacity (256 GB or more) SD card (or a large capacity SATA M.2 2280 SSD on Pearl Nano) must be installed to record events. Do not remove the SD card while files are uploading to Panopto.

Administrators can:

- Set up Panopto authentication for ad hoc events, see [Set up Panopto authentication for ad hoc events](#).
- Set Panopto ad hoc event parameters, [Set Panopto ad hoc event parameters](#).
- Change the extend event button time allotment in 5, 10, and 15 minute intervals, see [Set the extend Panopto CMS event interval](#).
- Enable muting audio and displaying an event paused image when an event is paused, see [Extend or pause CMS recordings and webcasts](#).
- Disable low disk space alert sent from Pearl Nano, see [Disable low disk space Panopto alerts](#).
- Create ad hoc events, see [Create ad hoc events using the Admin panel](#).
- View the Events page to see all upcoming scheduled sessions and completed sessions, see [View scheduled CMS events and history](#).

- Download local recordings for a channel, see [Recover channel backup recordings](#).
- Start and stop scheduled events before the scheduled time, see [Start/stop scheduled CMS events using the Admin panel](#).
- Extend and pause scheduled events, see [Extend or pause CMS recordings and webcasts](#).
- Configure Pearlto require user to give confirmation for a pre-scheduled event to start by selecting the Scheduled event opt-in check box.
- Configure Pearlto embed audio in all recorded files from channels recorded as part of Panopto event. This can be done by selecting the Enable embedded audio for all locally channel recordings check box.

General Information

- Starting or stopping a scheduled VOD event before the scheduled start or stop time does not change the event into an ad hoc event.
- Pearl Nano must be registered with Panopto to record and stream Panopto events, see [Enable CMS and register with Panopto](#).
- The maximum allowed bitrate for webcasts in Panopto is 2.5 Mbps, regardless of what bitrate is actually set for the target resolution of the remote recorder in Panopto. For example, when creating a scheduled webcasting event in Panopto, if you set the target resolution to a quality of 1920 x 1080 60 fps Bitrate: 4000 kbps, Pearl Nano streams the event at the maximum bitrate of 2500 kbps.
- Scheduled events have priority over ad hoc events. If an ad hoc event is still in progress when it's time to start a scheduled event, the ad hoc event is stopped and the scheduled event starts.
- Scheduled VOD events automatically start recording locally on Pearl Nano even if the network is down or Panopto is unavailable. After the session ends, the locally recorded files upload automatically to your folder in Panopto when the network link to Panopto is re-established.
- Scheduled webcasting events do not start if Pearl Nano's connection to the CMS is not available.
- If the network connection is lost during a file upload to Panopto, the transfer automatically restarts when the network connection re-establishes.
- If Pearl Nano loses power while a scheduled event is being recorded, the recording stops. If Pearl Nano is powered back on before the scheduled end time for the event, recording of the scheduled event restarts automatically and a second set of files are created. On Pearl Nano, a second recording is created. When the event ends, the files are uploaded to Panopto.
- If Pearl Nano was unavailable on the network or powered down and misses a scheduled event, the status of that event appears as **Skipped** on the Events page in the Admin panel.

- Do not use AFU or configure recording file size, type and other channel recording settings when CMS is enabled on Pearl Nano.
- For ad hoc events, Pearl Nano ignores a user's presets that are set in Panopto. As a result, ad hoc recordings automatically upload to the user's default folder as originally assigned by Panopto.
- Channel encoding settings you make on Pearl Nano are overridden by the default encoding settings the system uses to record to Panopto.



For Panopto VOD events, if you manually stop a scheduled VOD event before the scheduled end time when Pearl Nano doesn't have network connectivity, Pearl Nano uploads the completed event's recording when network connectivity resumes. However, Panopto does not recognize that the event has ended. The event remains in the In Progress state in Panopto and you must wait until the original event's scheduled end time before creating a new event using that Pearl Nano.

Encoding settings

Default Panopto encoding settings are applied automatically to the channel when Panopto is enabled, which override the existing encoding settings. If you manually change the encoding settings using the Admin panel after Panopto is enabled, the settings revert back to the default Panopto settings when a scheduled or ad hoc event starts.

You can change the channel resolution in Panopto when creating a new scheduled or recurring session. Pearl Nano also supports Panopto device templates so you can quickly set up your Pearl Nano remote recorder when you create a new event.

Pearl Nano information

- **Pearl Nano** - You can start and stop events earlier than the scheduled time, as well as pause an event using the Admin panel or the front panel control key interface on Pearl Nano.
- Panopto treats the channel you setup on Pearl Nano as a single video-source event for recordings and webcasts. For ad hoc events, the default name of the uploaded recording includes the date and start time of the event. For example: **2019-07-15 08:00**. A more intuitive name can be entered when the ad hoc event is created.
- For more information on using the front screen of Pearl Nano to start and stop events, see [Stop/start scheduled CMS events using Pearl Nano's front screen menu](#).
- Due to a Panopto limitation, single-channel recorders like the Pearl Nano can only be used as a *primary* recording device for scheduled events. Setting the Pearl Nano as a secondary recording device for a scheduled event will result in no secondary channel being recorded.

- To monitor the channel during an event, you can display the Channel view on Pearl Nano's front screen, see [Confidence monitoring using the front screen](#). You can also monitor the channel using the Admin panel or see a live preview of the channel and the audio level from the remote recorder page in Panopto.

Enable Schedule Opt-in for scheduled Panopto events

Pearl Nano will by default start executing scheduled events at their scheduled start time. However, sometimes it may be required for a user to give confirmation that a previously scheduled to start as scheduled. For example to avoid Pearl device recording and uploading an empty classroom, the device can be configured for a scheduled recording to proceed only when the faculty is present. This can be helpful in lowering compute and storage costs.

When enabled by Pearl device administrator, every scheduled event must be confirmed by a user for the event to proceed. This confirmation can be given using the following methods:

- Pearl device front screen
- [Delcom USB HID Programmable Single Button Switch, part number 706501](#) see, [Connect a USB control button to control CMS events](#).
- Pearl device REST API
- On the events page of Pearl device Admin Panel

Enable Schedule Opt-in Admin panel

1. Log into the Admin panel as admin.
2. From the Configuration menu, click **CMS**. The Content management system configuration page opens.
3. Under **Settings**, select **Scheduled event opt-in** and click **Apply** at the bottom of the page.
4. To disable this feature again, simply check **Schedule event opt-in** and click **Apply**.

Important considerations

1. If an scheduled event is not confirmed, Pearl device record or stream the event. The event will be marked as Not confirmed on Pearl device events page.
2. If an event is not confirmed on your Pearl device, during the scheduled time of the event, Pearl device, will show that event has not been confirmed and recording will not be happening. However,

Panopto will show that the event is being recorded.

3. Your Panopto instance will send an email alert warning you that an unconfirmed event is past due.

Set up Panopto authentication for ad hoc events

Panopto users can create unscheduled ad hoc events using the Admin panel. You can set up Pearl Nano to allow users to authenticate using their local Panopto login credentials, their credentials for a third-party LMS integrated with Panopto (like Canvas), and SAML 2.0 credentials if configured on Panopto.

The Pearl Nano uses a JavaScript web application to negotiate authentication with Panopto. You must create a new API client ID and add two URL redirects in Panopto for ad hoc event authentication to work. The Pearl Nano only needs a single URL redirect.

Before you begin, you need:

- Admin access to Panopto.
- A Pearl Nano remote recorder that's registered with Panopto.

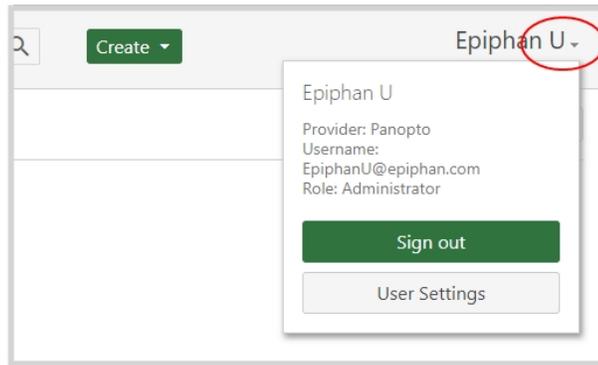
Important considerations

- Record all API client IDs and secret keys that are generated in Panopto somewhere safe. The ID and key cannot be retrieved after the screen is closed and must be regenerated if lost.
- You can use the same API Client ID to enable ad hoc authentication on multiple Pearl Nano systems; however, you must create a separate API client URL redirect for the web-based Admin UI of each individual Pearl Nano device.
- Third-party application authentication for ad hoc events is only supported for Panopto.

Enable ad hoc authentication on Pearl Nano

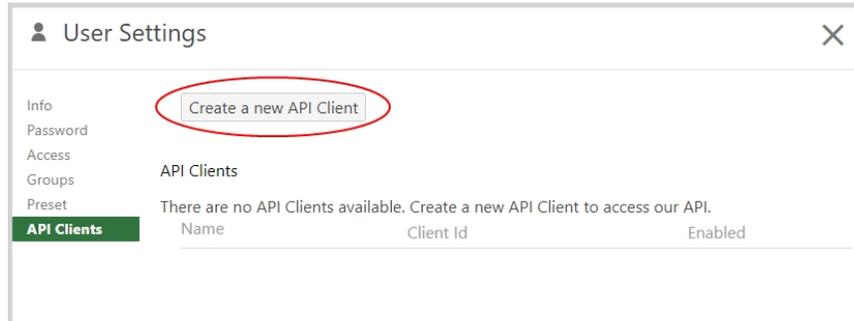
1. Log in to Panopto as an administrator.
2. In the header bar, click the arrow beside your user name and select **User Settings**. The User

Settings page opens.

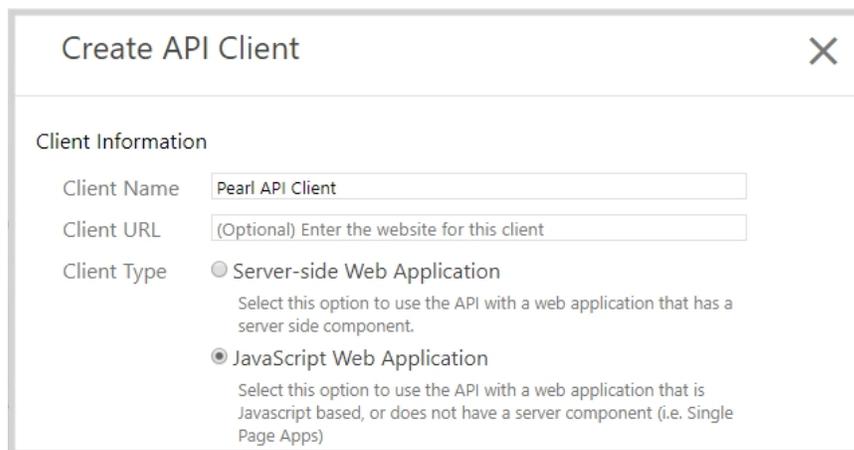


3. Create the API Client ID. Do the following:

- a. From the User Settings page, click **API Clients**, and then click **Create a new API Client**. The Create API Client page opens.

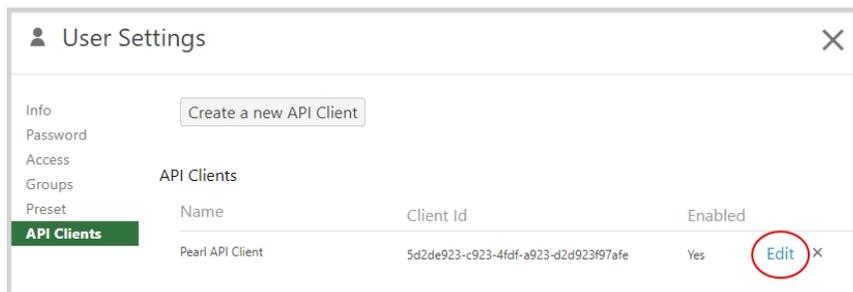


- b. From the Create API Client page, enter a unique name for the Pearl Nano API client in the **Client Name** field. If a client already exists in Panopto with that name, choose a different name.



- c. In the **Client Type** field, select JavaScript Web Application. . **Pearl Nano only-** then click **Create API Client**.
- d. On the **New API Client created** pop-up, record the Client ID and the Client Secret for future reference, and then click **OK**. The new Pearl API Client appears in your list of API clients.

4. Add a URL redirect for the web-based Admin panel to the Pearl API Client. Do the following:
 - a. From the User Settings page under API Clients, click **Edit** beside the **Pearl API Client** that you just created.



- b. In the Allowed Redirect URLs field, enter `http://<device_ip>/admin/events` where `<device_ip>` is the IP address of Pearl Nano.



If Pearl Nano is configured for https, enter `https://` instead of `http://`.

- c. In the URL Type field, select **Redirect URL**.
 - d. Click **Add URL**. The Admin panel URL redirect appears in the Allowed URL list.
5. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
6. From the Configuration menu, click **CMS**. The Content management system configuration page opens.
7. In the **Unscheduled ad hoc events** section, enter the Pearl Nano **API client id** that was generated earlier, and then click **Apply**.

Set Panopto ad hoc event parameters

Using the Admin panel, you can set parameters that are associated with ad hoc events, including:

- **Upload destination:** Choose whether you want the recorded files from ad hoc events to be automatically uploaded to the Panopto **Default Folder** assigned to Pearl or to a user selectable folder. Options are default folder or user selectable folder.
- **Enable user-customizable ad hoc events:** If this is selected, user will have the option to customize the event title, duration and event type using Pearl management interface.
- **Session title:** This assigns a default title for ad hoc events. Default variables specify the current date and time as the title using the format **yyy-mm-dd hh:mm**. This default title can be changed when an ad hoc event is created. Otherwise, the default values specified here will be used.

- **API client id:** This is the API client ID that was generated for ad hoc event authentication, see [Set up Panopto authentication for ad hoc events](#). Required if **user selectable folder** is selected as the **Upload destination**.
- **Duration:** Assign a default duration for ad hoc events. This value can be changed when an ad hoc event is created.
- **Event type:** Options are VOD or Live stream. The former will record and upload files to Panopto when the event events and the latter will only live stream the event.



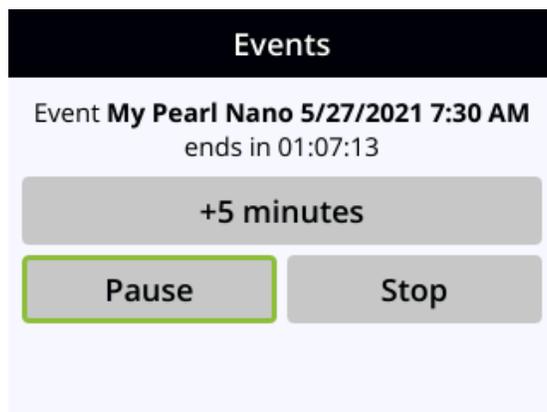
Pearl Nano must be connected to Panopto for this procedure to work.

Enter Panopto ad hoc event parameters using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. Under **Unscheduled ad hoc events**, enter the information you want associated with this ad hoc event and click **Apply**

Set the extend Panopto CMS event interval

A button on the front screen lets users extend the length of an event that is in progress. By default, the event is extended in 5 minute intervals each time the button is tapped. Using the Admin panel, you can set the amount of time the event is extended to 5, 10, or 15 minute intervals. Events cannot be extended beyond the start of the next scheduled event.



Set the extend Panopto CMS event interval using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. Under **Settings**, select the **Extend event** time interval from the drop down list and click **Apply**.

Content management system configuration

Choose CMS: Panopto

Registration

Status:

Service URL:

Registration key:

Device name:

Settings

Low disk space alert

Upload the webcast recording

Extend event: 5 minutes

Display "Event paused" image and mute on pause

Unscheduled ad hoc events

Session title:

API client id:

Duration: minutes

Automatically logout

Upload schedule

File upload schedule

Start upload: 08:00

Stop upload: 18:00

Enable mute and display image on pause

Using the Admin panel, you can set up Pearl Nano to automatically mute the audio and display an event paused image while a Panopto event is paused.



Pearl Nano records and uploads the full event to Panopto for processing. After the event is uploaded, Panopto removes the paused segments from the final recording. However, Panopto does not remove paused segments from webcasts. The complete webcast recording including the time the event was paused is retained.

Enable mute and display image on pause using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. Under **Settings**, check **Display "Event paused" image and mute on pause**, then click **Apply** at the bottom of the page.

Content management system configuration

Choose CMS: Panopto

Registration

Status:

Service URL:

Registration key:

Device name:

Settings

Low disk space alert

Upload the webcast recording

Extend event: 5 minutes

Display "Event paused" image and mute on pause

Unscheduled ad hoc events

Session title:

API client id:

Duration: minutes

Automatically logout

Upload schedule

File upload schedule

Start upload: 08:00

Stop upload: 18:00

Disable low disk space Panopto alerts

Pearl Nano sends a low disk space alert to Panopto when the amount of internal storage space on the device is low. You can disable the low disk space alerts that Pearl Nano sends to Panopto using the Admin

panel and enable it again at any time.

Disable low disk space Panopto alerts using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration page opens.
3. Under **Settings**, uncheck **Low disk space alert** and click **Apply** at the bottom of the page to disable sending these alerts to Panopto.

Content management system configuration

Choose CMS: **Panopto** ▼
Apply

Registration

Status:
Service URL:
Registration key:
Device name:

Settings

Low disk space alert
 Upload the webcast recording
Extend event: **5 minutes** ▼
 Display "Event paused" image and mute on pause

Unscheduled ad hoc events

Session title:
API client id:
Duration: minutes
 Automatically logout

Upload schedule

File upload schedule
Start upload: ▼
Stop upload: ▼
Apply

4. To enable this feature again, simply check **Low disk space alert** and click **Apply**.

YuJa setup

Pearl-2, Pearl Mini, and Pearl Nano hardware encoders integrate directly with YuJa. Once paired, Pearl can access your YuJa calendar to automatically start and stop recordings or streams at scheduled times.

Pearl automatically pushes event recordings to YuJa, minimizing administration time and ensuring your content makes it to the right place.

For more information see:

- [YuJa known issues](#)
- [YuJa registration](#)
- [YuJa settings](#)
- [Creating, modifying, and deleting YuJa events](#)
- [Set the extend YuJa CMS event interval](#)
- [View YuJa events](#)
- [Accessing YuJa recordings](#)

For additional information on YuJa, see [YuJa's support page](#).

YuJa known issues

This section includes known issues or limitations that affect YuJa functionality or usability and ways that you can work around these limitations.

- If you delete a profile that is linked to a future event, Pearl will remember the profile's settings and apply them regardless of deletion. Instead, remove the profile from the event in YuJa before deletion.
- If the Pearl admin is taking a long time to load or apply YuJa settings, the YuJa server may be unavailable. The Pearl admin page may provide inaccurate information or no message at all. If you have trouble establishing a connection between your Pearl device and YuJa, contact Epiphan support.
- YuJa Video Platform may not always show accurate Pearl device connectivity status.
- Profiles may not be reflected accurately in YuJa previews. The YuJa preview may seem incorrect. However, YuJa streaming/recording will work as intended.
- If you rename your Pearl device in the YuJa interface, this name will not be updated in the Pearl admin or on the Pearl device.

- If you start an event early in YuJa using any Pearl interface and then extend the event, the event appears to extend but ends at the originally scheduled ending time.

YuJa registration

Pearl Nano is fully integrated with YuJa for a seamless video recording and webcasting experience. After your Pearl device is registered, it appears as a resource in YuJa's device list and can be selected for scheduled recordings and webcasts. Registering a Pearl device with YuJa only needs to be done once.

To register your Pearl device with YuJa:

1. Log in to the Admin panel as **admin**. For more information, see [Connect to the Admin panel](#).
2. Click **CMS** in the **Configuration** panel.
3. Select **YuJa** in the **Choose CMS** dropdown. Click **Apply**.
4. When integrating YuJa with Pearl Nano you'll need an authentication token. In YuJa this is also called an API Token. For information on finding the API Token in YuJa, contact your YuJa administrator.
 - When generating an API token ensure that it has at least the same permissions as in the image below or the integration will not work correctly,

API Token

Select/Deselect All

- User Object Model**
 - Retrieve All Users / Add a User
 - Retrieve / Update / Delete a Single Use
 - Retrieve all Groups a User is Enrolled In
 - Retrieve Group Names By User
- Group Object Model**
 - Retrieve / Create a Group for the Organization
 - Update / Delete / Retrieve a Single Group
 - Retrieve Group Details
 - Add Group Members
 - Remove Group Members
 - Retrieve Group Members
 - Create a Group
- Analytic Object Report Model**
 - Retrieve Group Bandwidth Report
 - Retrieve Group Storage Report
 - Retrieve Group Video View Report
 - Retrieve Visitor View Report
- Course Object Model**
 - Retrieve / Create a Course for Organization
 - Update / Delete / Retrieve a Single Course
 - Retrieve Course Details
 - Add Course Members
 - Remove Course Members
 - Retrieve Course Members
- Device Object Model**
 - Retrieve / Update Device
 - Register / Delete Device
 - Retrieve All Schedules for a Device
 - Create / Delete / Update Sessions
 - Create / Retrieve Capture Profiles
 - Start / Stop Recording Sessions
 - Update / Delete a Hub Profile
 - Play / Pause Recording Sessions
 - Retrieve Audio / Image and URLs
 - Pause / Resume Live Stream Playback
 - Extend / Stop Third-Party Device Session
 - Send Software Capture Status
 - Get / Delete Schedules
 - Update / Delete Third-Party Profiles
 - Return YuJa Profile ID Based on External ID
 - Other
- Audit Log Object Model**
 - Retrieve Logs
- User Group Object Model**
 - Create Group / Add Members to Group
 - Retrieve Groups
 - Retrieve members by group name
 - Retrieve members by Group ID
 - Retrieve group by Group ID
 - Edit group name
 - Delete Group By GroupID
 - Clear group members by Group Id
 - Remove User from Group
- Media Object Model**
 - Retrieve Video Details
 - Retrieve Upload Link
 - Upload Video Details
 - Publish Video
 - Publish Video For EnterpriseTube/InternalLibrary
 - UnPublish Video
 - Replace Video
 - Retrieve Course Videos
 - Retrieve Video Links
 - Retrieve Media Player Branding
 - Update Media Player Branding
 - Retrieve User Assets
 - Generate Link to Upload Recordings
 - Start Video Processing for S3 URLs
 - Retrieve / Insert / Delete Video Metadata
 - Retrieve HLS Streams
 - Retrieve Thumbnail URL
 - Attach / Delete Media Files and Timestamps
 - Insert / Delete Text for Captions and Transcripts
 - Transcribe Using Video Captions
 - Obtain Folder Information
 - Search Video
 - Retrieve User Videos / Media Files / Folders
 - Retrieve EnterpriseTube/InternalLibrary Folders
 - Add Multi-Stream Video
 - Modify Permission
 - RSS
 - Create folder in shared folder
 - Create folder in Enterprisetube Library
 - Upload Caption/Transcript(PID/TXT)
 - mediaByLinkageValue

5. Enter the following information into the **YuJa settings** section of the page:

- **YuJa Service URL:** This is your organization's unique URL for YuJa. It will look like this:

`https://your-organization.yuja.com/`

For more information on your YuJa Service URL, contact your YuJa administrator.

- **Authentication token:** This is a randomly generated series of numbers and letters provided by YuJa that is mentioned in the previous step. In YuJa it is called an API Token. Copy and paste an API Token in here.
- **User ID Type:** Select **Username**
- **User ID:** Enter your YuJa user name.
- **Device name:** Label your Pearl device something that will make sense when you (and others) read it in YuJa. For example, "Biology Lab 1" or "Classroom 237".

6. Click **Apply**. If the information was entered successfully, the **Status** will update to **Registered**.

Once your Pearl device is registered with YuJa, YuJa will recognize your Pearl device and it will appear in the YuJa list of devices. After registering your product, see [YuJa settings](#) to configure the Pearl device for YuJa.



To deregister your Pearl device from YuJa, click **Deregister device** in the **YuJa settings** section.

YuJa settings

The following list of features is available once your Pearl device has been registered with YuJa. For more information on registering your Pearl device, see [YuJa registration](#).



If you select Motion JPEG encoding, it will be overridden. Contact your YuJa administrator to ensure your Pearl channels are correctly configured for YuJa.

YuJa profiles

Profiles tell Pearl which channels will be recorded and/or streamed for a scheduled YuJa event.

For example, your Pearl 2 may have a channel connected to a laptop called **Slides** and a channel called **Camera**. YuJa can capture up to three channels simultaneously, or a single channel.

Click **+ Create new** to create a new profile or **Select a profile** from the list.

Profile configuration

- **Profile name** - Enter the name for the profile.
- **Channel configuration** - Select which channels will be recorded and/or streamed when this profile is used for a scheduled event.
- **Live streaming** - Enable or disable live streaming for this profile. When live streaming is enabled for this profile, the selected channel(s) will be live streamed when this profile is selected for a scheduled event.

Click **Apply** when you have configured your profile.



All channels that are live streamed for an event are also recorded locally and uploaded to YuJa when the event ends.

Upload Settings

These settings are optional - they are not required for deployment.

- **File upload schedule** - Select the check box to enable scheduled file uploads. If enabled, locally recorded files will only be uploaded to YuJa between the start and stop upload times.
- **Start upload** - Select a start time for file uploads
- **Stop upload** - Select a finish time for file uploads.

Click **Apply** when you have configured your upload settings.



YuJa events must be scheduled in YuJa. To view YuJa events in the Pearl admin panel, click **Events** and look under **Scheduled events**.

Creating, modifying, and deleting YuJa events

Once a Pearl device is registered with YuJa, scheduled events can be created, modified, and deleted.

All creation, modification, and deletion of YuJa events must be done from the YuJa interface. To learn more about creating, modifying, and deleting events in YuJa, contact your YuJa administrator.

Once an event has been created in YuJa, view the event in the Pearl Admin panel by clicking **Events** in the navigation pane.



Once an event is scheduled in YuJa, click **Refresh schedule** in the Pearl Admin panel and the event will appear. Alternatively, wait five minutes for the Pearl device to automatically refresh and pull scheduled events from YuJa.



Do not restart your Pearl device during a YuJa scheduled event.

Accessing YuJa recordings

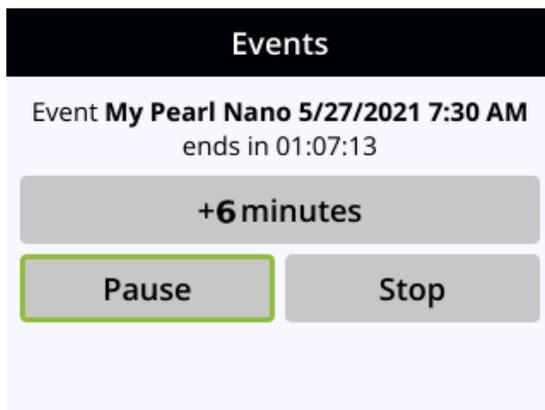
All YuJa recordings are automatically uploaded to YuJa. For more information on accessing the recordings, contact your YuJa administrator.



The Pearl Nano's Automatic File Upload (AFU) feature is not available when the Pearl device is registered to YuJa.

Set the extend YuJa CMS event interval

A button on the front screen lets users extend the length of an event that is in progress. By default, the event is extended in 6 minute intervals each time the button is tapped. Using the Admin panel, you can set the amount of time the event is extended to 6, 10, or 15 minute intervals. Events cannot be extended beyond the start of the next scheduled event.



Set the extend YuJa CMS event interval using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. Under **Settings**, select the **Extend event** time interval from the drop down list and click **Apply**.

View YuJa events

There are several ways to view YuJa events linked to your Pearl device:

- **Pearl Admin panel** - Log in to the Pearl Admin panel as **admin**, then click **Events** in the Pearl Admin navigation pane.
- **Epiphan Cloud** - Log in to Epiphan Cloud, then click **Events** in the Epiphan Cloud navigation pane.
- **Pearl device screen** - Select the **Events** screen on your Pearl device's touch screen or front screen to display any upcoming YuJa events and any YuJa event in progress.
- **MultiViewer** - Enable CMS events for MultiViewer and MultiViewer will display event name, time left before event start, and current event details.
- **YuJa** - Contact your YuJa administrator to view YuJa events.

Opencast registration

Pearl Nano is fully integrated with Opencast Content Management Systems (CMSs) for a seamless video recording and streaming experience. After a simple registration process, which involves configuring Pearl with the URL of the Opencast instance, credential and name for the capture agent, Pearl Nano is available for your CMS users to select as an Opencast capture agent for scheduled, recurring, and ad hoc events. Completed recordings automatically upload to the Opencast. Registering Pearl Nano as a capture agent for Opencast only needs to be done once.

Topics include:

- [Enable CMS and register with Opencast](#)
- [Disable CMS and disconnect from Opencast](#)

Enable CMS and register with Opencast

Use the Admin panel to register Pearl Nano as an Opencast Capture Agent (CA) for scheduled, recurring, and ad hoc recordings. When you register Pearl Nano, a default name is assigned that includes the serial number of Pearl Nano. This name appears in the list of capture agents in Opencast. You can change the CA name using the Admin panel.

Before you begin, you need:

- Your Opencast service URL, for example: `https://stable.opencast.org//`
- Opencast user name and password for your capture agent

Important considerations

- The Opencast user name of type either opencast or system may be used by Pearl to register with Opencast.
- If Pearl is going to use an Opencast user name that was created using the Opencast Admin UI, then this user name must have the following minimum Opencast roles: **ROLE_API_EVENTS_CREATE, ROLE_API_EVENTS_EDIT, ROLE_API_WORKFLOW_DEFINITION_VIEW, ROLE_API_EVENTS_SCHEDULING_EDIT, ROLE_CAPTURE_AGENT**
- If Pearl is going to be used to create ad hoc or unscheduled events and opencast user name of type opencast was used by Pearl, make sure that this user has the opencast **ROLE_ADMIN**.

Enable Pearl Nano as a capture agent and register with Opencast using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration page opens.
3. From the **Choose CMS** drop down, select **Opencast** and then click **Apply**.
4. Enter the Opencast **Service URL**, **username** and **password**.
5. Optionally enter a **Device name** you want to appear in Opencast for this device, then click **Apply** at the bottom of the page. The Status updates to Connected.

What's next?

Proceed to select which Pearl channels will be advertised to Opencast server and settings for ad hoc events, and select default settings. See [Opencast recording and streaming setup](#).

Disable CMS and disconnect from Opencast

When you use the Admin panel to disable CMS on Pearl Nano, the remote recorder disconnects from Opencast. As long as Pearl Nano is still registered, you can create new scheduled sessions in Opencast for this remote recorder, but the events schedule won't synchronize until CMS is re-enabled.

If CMS is re-enabled on Pearl Nano before a VOD session is scheduled to end, recording starts automatically on Pearl Nano when the connection to Opencast is re-established.

Important considerations

- You cannot start unscheduled ad hoc events when CMS is disabled on Pearl Nano.
- Sessions that are scheduled to start while CMS is disabled on Pearl Nano do not start on Pearl Nano.
- Deleting Pearl Nano in Opencast permanently deletes future scheduled and recurring sessions associated with that remote recorder.
- Do not disable CMS while an event is in progress.

Disconnect Pearl Nano from Panopto using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu

opens.

3. To disconnect Pearl Nano, select **none** from the **Choose CMS** drop down and then click **Apply**.

Opencast recording and streaming setup

Pearl Nano appears as an available capture agent as soon as the device is registered with Opencast. After a successful registration, you're ready to select video sources for a multiple source Opencast event. Video sources must be connected to Pearl Nano and assigned to a channel. Each channel configure on Pearl Nano is treated as a separate video source for single or multiple source recording events in Opencast. Optionally, administrator can also configured and select a streaming destination for each Pearl channel that will be automatically started and stop according an Opencast scheduled recording.

For more information about channels, see [What is a channel?](#).

Topics include:

- [About Opencast recording and streaming](#)
- [Set Opencast ad hoc event parameters](#)
- [Set the extend Opencast CMS event interval](#)
- [Set the extend Opencast CMS event interval](#)

[Set the extend Opencast CMS event interval](#)

About Opencast recording and streaming

The Pearl supports scheduled, recurring, and unscheduled ad hoc recordings and live webcasts. Scheduled events start and end automatically. No manual intervention is required. After the event ends, recorded files automatically upload to Opencast. Backup recordings are also saved locally on Pearl. If the network connection or the CMS goes down during an event, Pearl continues to record locally and uploads the recording when network connectivity resumes.



Pearl Mini and Pearl Nano - A large capacity (256 GB or more) SD card (or a large capacity SATA M.2 2280 SSD on Pearl Nano) must be installed to record events. Do not remove the SD card while files are uploading to Panopto.

Administrators can:

- Select which channel(s) can be selected to be captured and recorded for an Opencast event.
- Configure and select which Opencast flavor will be used for recorded Pearl channel.

- Select a pre-configured streaming destination for a channel. Streaming to this destination will be automatically started when a scheduled Opencast event starts and automatically stopped when the schedule ends.
 - The streaming protocol for this destination can be any streaming protocol that both Pearl and streaming server supports.
- Set Opencast ad hoc event parameters, [Set Opencast ad hoc event parameters](#).
- Change the extend event button time allotment in 5, 10, and 15 minute intervals, see [Set the extend Opencast CMS event interval](#).
- Create ad hoc events, see [Create ad hoc events using the Admin panel](#).
- View the Events page to see all upcoming scheduled sessions and completed sessions, see [View scheduled CMS events and history](#).
- Download local recordings for a channel, see [Recover channel backup recordings](#).
- Start and stop scheduled events before the scheduled time, see [Start/stop scheduled CMS events using the Admin panel](#).
- Extend and pause scheduled events, see [Extend or pause CMS recordings and webcasts](#).

General Information

- Starting or stopping a scheduled VOD event before the scheduled start or stop time does not change the event into an ad hoc event.
- Pearl Nano must be registered with Opencast to record and stream Opencast events, see [Enable CMS and register with Opencast](#).
- Scheduled events have priority over ad hoc events. If an ad hoc event is still in progress when it's time to start a scheduled event, the ad hoc event is stopped and the scheduled event starts.
- Scheduled VOD events automatically start recording locally on Pearl Nano even if the network is down or Opencast is unavailable. After the session ends, the locally recorded files upload automatically to Opencast when the network link to Opencast is re-established.
- If the network connection is lost during a file upload to Opencast, the transfer automatically restarts when the network connection re-establishes.
- If Pearl Nano loses power while a scheduled event is being recorded, the recording stops. If Pearl Nano is powered back on before the scheduled end time for the event, recording of the scheduled event restarts automatically and a second set of files are created. On Pearl Nano, a second recording is created. When the event ends, the files are automatically uploaded to Opencast.
- If Pearl Nano was unavailable on the network or powered down and misses a scheduled event, the status of that event appears as **Skipped** on the Events page in the Admin panel.

- Do not use AFU or configure recording file size, type and other channel recording settings when CMS is enabled on Pearl Nano.

Pearl Nano information

- **Pearl Nano** - You can start and stop events earlier than the scheduled time, as well as pause an event using the Admin panel or the front panel control key interface on Pearl Nano.
- Opencast treats the channel you setup on Pearl Nano as a single video-source event for recordings. For ad hoc events, the default name of the uploaded recording includes the date and start time of the event. For example: **2019-07-15 08:00**. A more intuitive name can be entered when the ad hoc event is created.
- For more information on using the front screen of Pearl Nano to start and stop events, see [Stop/start scheduled CMS events using Pearl Nano's front screen menu](#).
- To monitor the channel during an event, you can display the Channel view on Pearl Nano's front screen, see [Confidence monitoring using the front screen](#). You can also monitor the channel using the Admin panel or see a live preview of the channel and the audio level from the remote recorder page in Panopto.

Set the extend Opencast CMS event interval

A button on the front screen lets users extend the length of an event that is in progress. By default, the event is extended in 5 minute intervals each time the button is tapped. Using the Admin panel, you can set the amount of time the event is extended to 5, 10, or 15 minute intervals. Events cannot be extended beyond the start of the next scheduled event.

Set the extend Opencast CMS event interval using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. Under **Settings**, select the **Extend event** time interval from the drop down list and click **Apply**.

Enable Schedule Opt-in for Opencast events

Pearl Nano will by default start executing scheduled events at their scheduled start time. However, sometimes it may be required for a user to give confirmation that a previously scheduled to start as scheduled. For example to avoid Pearl device recording and uploading an empty classroom, the device can be configured for a scheduled recording to proceed only when the faculty is present. This can be helpful in lowering compute and storage costs.

When enabled by Pearl device administrator, every scheduled event must be confirmed by a user for the event to proceed. This confirmation can be given using the following methods:

- Pearl device front screen
- [Delcom USB HID Programmable Single Button Switch, part number 706501](#)
- Pearl device REST API
- On the events page of Pearl device Admin Panel

Enable Schedule Opt-in Admin panel

1. Log into the Admin panel as admin.
2. From the Configuration menu, click **CMS**. The Content management system configuration page opens.
3. Under **Settings**, select **Scheduled event opt-in** and click **Apply** at the bottom of the page.
4. To disable this feature again, simply check **Schedule event opt-in** and click **Apply**.

Set Opencast ad hoc event parameters

Using the Admin panel, you can set parameters that are associated with ad hoc events, including:

- **Session title:** This assigns a default title for ad hoc events. Default variables specify the current date and time as the title using the format **yyy-mm-dd hh:mm**. This default title can be changed when an ad hoc event is created.
- **Duration:** Assign a default duration for ad hoc events. This value can be changed when an ad hoc event is created.
- **Subject:** This assigns a default subject for Opencast ad hoc events. This default title can be changed when an ad hoc event is created.

- Description: This assigns a default description for Opencast ad hoc events. This can be changed when an ad hoc event is created.



Pearl Nano must be registered with Opencast for this procedure to work.

Enter Opencast ad hoc event parameters using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.
3. Under **Unscheduled ad hoc events**, enter the information you want associated with this ad hoc event and click **Apply**

CMS recording and webcasting control

Pearl Nano appears as an available resource as soon as the device is registered with your CMS and records scheduled events, recurring events, and unscheduled ad hoc events for the CMS the Pearl is registered with. Connect multiple audio and video sources directly to Pearl Nano and record content from HD cameras, document cameras, HDMI output from computers, and even digital microscope cameras.

Scheduled events start and end automatically. No manual intervention is required. After the event ends, recorded files automatically upload to the CMS. If the network connection or the CMS goes down during an event, it records locally on Pearl Nano and uploads automatically when network connectivity resumes. You can manually control recording and webcasting using the Admin panel or the device screen. Back up recordings are easily recovered using the Admin panel.



Do not schedule recordings that are longer than the capacity of Pearl Nano to store the recording on it's local drive. We recommend using large capacity SD cards such as 256 GB or a large capacity SATA M.2 SSSD when using Pearl Nano with a CMS.



Do not remove your storage device from the Pearl device during a recording.

Topics include:

- [Start/stop scheduled CMS events using the Admin panel](#)
- [Extend or pause CMS recordings and webcasts](#)

- [Stop/start scheduled CMS events using Pearl Nano's front screen menu](#)
- [Create ad hoc events using the Admin panel](#)
- [Log out of an ad hoc session](#)
- [Schedule when CMS event recordings upload](#)
- [Recover channel backup recordings](#)

For important considerations before recording or webcasting to a CMS, see [About Kaltura recording and webcasting](#) and [About Panopto recording and webcasting](#).

Set up a CMS start screen

You can use the Admin panel to set the Pearl device to show the Content Management System (CMS) Events screen on the Pearl device screen at start up. You can also lock the start screen to restrict access to any other screen. Locking the start screen is useful when operating the Pearl device in public spaces, classrooms, and unmanned kiosks.

To access the touch screen configuration page (front screen configuration page on Pearl Nano), click **Touch Screen (Front Screen)** for Pearl Nano) in the navigation pane of the Admin panel.

The start screen options for CMS event control are:

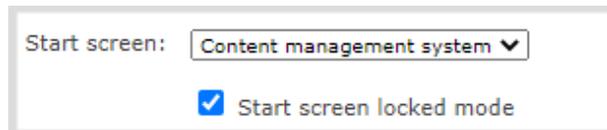
- **Default:** The CMS Events screen appears automatically on the device screen when CMS is enabled and there's an upcoming scheduled event. On Pearl-2 or Pearl Mini you can also tap the calendar icon at the bottom of the touch screen.
- **Content Management System:** The CMS Events screen displays automatically on the device screen when you power on the Pearl device. Operators can still navigate to other screens using the device screen.
- **Start screen locked mode:** The CMS Events start screen is the only screen that displays on the screen of the Pearl device. Operators cannot navigate to other screens.

If no 4-digit PIN set when the start screen is in locked mode, you can access the CMS Events start screen right away. However, you cannot access any other screens.

If you set a 4-digit PIN when the start screen is in locked mode, a lock appears in the top right of the start screen. You must enter the PIN to unlock the CMS Events start screen and access the other screens. When you return to the CMS Events start screen, Pearl device automatically locks itself and you must re-enter the 4-digit PIN to unlock the screen.

Setup a CMS Events start screen using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Touch Screen (Front Screen on Nano)**. The **Touch Screen/Front Screen** configuration page opens.
3. From the **Start screen** drop-down menu, select **Content Management System**.
4. (Optional) Check **Start screen locked mode** and set a 4-digit PIN. For more information about setting a PIN, see [Set a PIN security code](#).



5. Click **Apply**.

 If you chose **Content Management System**, the Pearl device screen automatically refreshes to display the CMS Events screen.

Start/stop scheduled CMS events using the Admin panel

You can start scheduled CMS events from the Events menu using the Admin panel and stop events before their scheduled end time. After an event ends, the recorded video files upload automatically to the CMS.

Important considerations

- If you manually stop a scheduled CMS VOD event before the scheduled end time when the Pearl device doesn't have network connectivity, the Pearl device uploads the completed event's recording when network connectivity resumes. However, Panopto does not recognize that the event has ended. The event remains in the In Progress state in Panopto and you must wait until the original event's scheduled end time before creating a new event using that Pearl device.
- Do not power down a Pearl device while a scheduled webcast event is in progress. The webcast ends but the RTMP stream that was created automatically on the Pearl device is not deleted from the channel's Streaming page. Use the Admin panel to manually delete the webcast stream instance from the channel's Streaming page.

Start a scheduled CMS event using the Admin panel

From the Admin panel, select the Events menu and click **Start** beside the scheduled event on the Events page.

Events

Last updated 14:53, 2021-11-15

Refresh schedule

Not logged in

Create new event

Ongoing and completed events

Event	Name	Type	Status
2021-11-15 13:53-13:55	Nov 15 VOD event	VOD	Complete
2021-11-15 13:20-13:23	Nov 15 live event	Live-stream	Complete

Page 1 of 1

Scheduled events

Event	Name	Type
2021-11-15 14:55-14:57	Epiphan U Session	VOD

Page 1 of 1

Stop a scheduled CMS event using the Admin panel

Under **Ongoing and completed events**, a **Stop** button appears beside the event while the event is recording. You can select that to stop the event before the scheduled end time.

Ongoing and completed events

Event	Name	Type	Status
2021-11-15 14:55-14:57	Epiphan U Session	VOD	Recording. Ends in 00:58:49
2021-11-15 13:53-13:55	Nov 15 VOD event	VOD	Complete
2021-11-15 13:20-13:23	Nov 15 live event	Live-stream	Complete

TIP: In the Admin panel, you can click **Refresh schedule** at any time to manually update the events listed on the Events page.

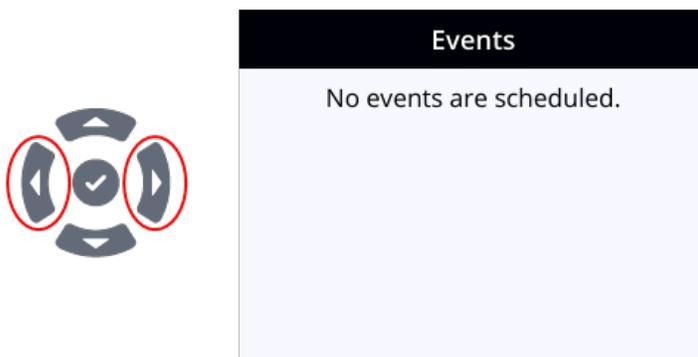


After the event ends, it may take a while for content to show up in Kaltura's media lists, depending on how busy the Kaltura CMS system is at the time.

Stop/start scheduled CMS events using Pearl Nano's front screen menu

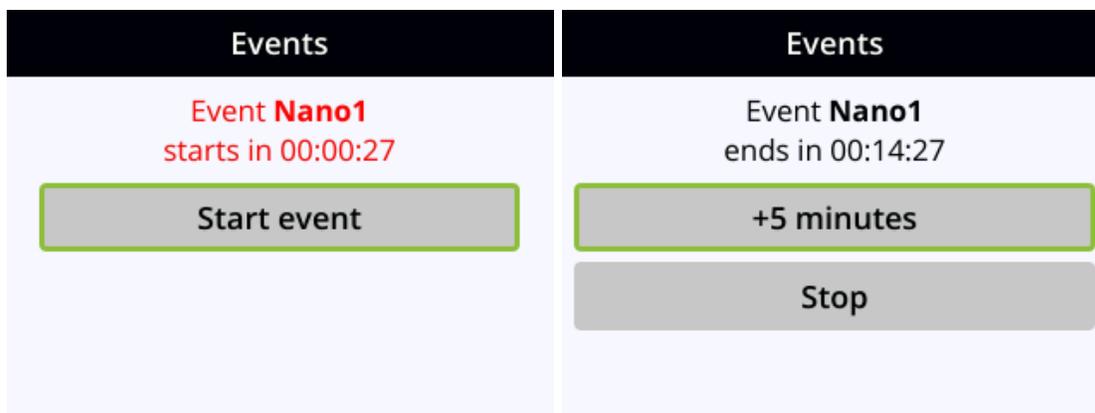
You can use the Pearl Nano's front screen and the control key interface to manually start scheduled events up to thirty minutes before the scheduled start time.

When CMS is enabled on Pearl Nano, an Events screen is added to the screens you can view on the front screen. If you don't see the Events screen on the front screen, press the **left arrow** key (or the right arrow key) on the control key interface to cycle through the different views.



When an event is scheduled, the Event screen updates with the event name and a countdown timer. Five minutes before the scheduled event, the event name and timer on the Events screen turn red. You can select **Start event** using the control keys to start the event up to a half an hour before the scheduled start time.

When the event starts, the button changes to Stop event. Select **Stop event** when you're done or just wait for the event to stop automatically at the scheduled time. Recordings upload automatically to your CMS.



For important considerations before recording or webcasting to a CMS, see [About Kaltura recording and webcasting](#) and [About Panopto recording and webcasting](#), or [YuJa setup](#).

Important information

- Your Pearl device must already be registered with your CMS to appear listed as a remote recorder resource in Kaltura or Panopto. Contact your CMS administrator responsible for setting up hardware encoders for your organization if the Pearl device isn't listed as a resource or the calendar icon does not appear on the front screen.
- Pearl Nano's channel is treated as a single, primary video source in Kaltura and Panopto.
- For Kaltura, the channel used for live streaming is pre-configured by the Pearl administrator.
- Panopto users can select the resolution for the video source in Panopto when a new scheduled or recurring session is created. The encoding settings are applied automatically to the channel on Pearl Nano
- After the event ends, recordings automatically upload to the CMS. It may take a while for content to show up in Kaltura's media lists, depending on how busy the Kaltura CMS system is at that time. Recordings are associated with the user account that scheduled the event.
- If network connectivity is lost during a scheduled VOD event, the Pearl device continues to record the event locally. When network connectivity re-establishes and the event ends, the recording uploads to the CMS as expected.



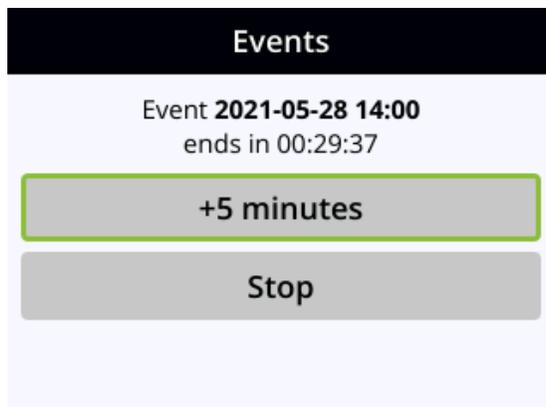
For Panopto VOD events, if you manually stop a scheduled VOD event before the scheduled end time when the Pearl device doesn't have network connectivity, the Pearl device uploads the completed event's recording when network connectivity resumes. However, Panopto does not recognize that the event has ended. The event remains in the In Progress state in Panopto and you must wait until the original event's scheduled end time before creating a new event using that Pearl device.

Extend or pause CMS recordings and webcasts

You can extend an active scheduled or ad hoc event using the Pearl device's front screen or the Admin panel. The extend event button can be configured to add 5, 10, or 15 minutes to the event each time it is selected, or 6, 10, or 15 in the case of YuJa. See [Set the extend Kaltura CMS event interval](#), [Set the extend Panopto CMS event interval](#), [Set the extend Opencast CMS event interval](#) or [Set the extend YuJa CMS event interval](#), depending on the integrated CMS.

The option to extend the event appears on the Events screen while the event is in progress. Events cannot be extended beyond the start of the next scheduled event.

On the Pearl Nano, use the front panel control key interface to select the button to add the specified amount of time to the current event.



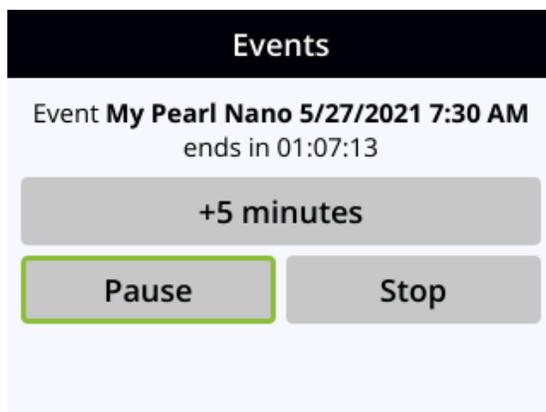
For Panopto, Opencast and Yuja events, you can also pause active recordings and webcasts from the Pearl device screen or using the Admin panel. An extra pause button appears on the Events screen. For Panopto you can also set up your Pearl device to mute the audio and display an event paused image to let your viewers know the event is paused, see [Enable mute and display image on pause](#).



If **mute on pause** and the on-screen **pause illustration** are not enabled on your Pearl device, your viewers watching the stream can see and hear the live webcast while the event is paused, as well as in the recording in Panopto



If an Opencast event is paused, audio is muted and an event paused image is displayed to let viewers know that the event is paused. The duration for which the recording was paused is not edited out of the video however.



Important information

- The Pearl Nano records and uploads the full event to Panopto, or YuJa, for processing. After the event is uploaded, the CMS platform removes the paused segments from the final recording. However, Panopto and YuJa do not remove paused segments from webcasts. The complete webcast recording including the time the event was paused is kept.
- If audio doesn't mute and an event paused screen doesn't appear, you must enable that feature using the Admin panel, see [Enable mute and display image on pause](#).
- If Opencast event is paused, audio is muted and an event paused image is displayed to let viewers know that the event is paused. The duration for which the recording was paused is not edited out of the video however.

Pause an event using a programmable USB attached button

Panopto, Opencast or YuJa recording in progress on Pearl can be paused and then resumed using a programmable USB attached button. The following Delcom USB button are supported:

- Delcom USB HID Programmable Single Button Switch, part number 706501

Programming the Delcom USB HID Programmable Single Button Switch

1. Download, install and start the Delcom Software utility on a Windows computer.
2. Connect the Delcom USB Single Button switch to a USB port on the computer.
3. Within the Delcom setup utility, click the **Read Device** button.
4. Verify that the Delcom setup utility is able to successfully detect and read data from the attached USB button.

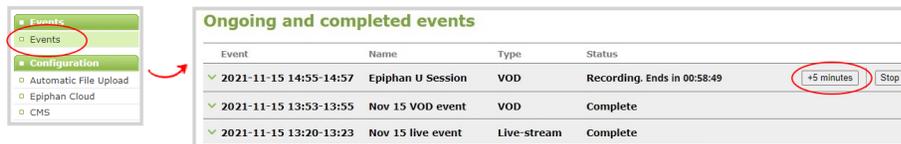
5. In the Button setup section of the setup utility, program BUTTON 1 of the switch with the following settings:
 - a. **TYPE:** KEYBOARD
 - b. **ACTION:** Momentary
 - c. **CODE:** 19 - Keyboard p and P
 - d. **LED:** Off
 - e. **Init:** selected
6. Click **Program Device**.
7. Click **Yes**, when prompted to program the device.
8. Verify that the programming was successful.
9. Within the Delcom setup utility, click the **Read Device** button to verify the settings match those programmed.

To pause a Panopto, Opencast or YuJa event that is in progress:

1. Attach the Delcom USB HID Programmable Single Button Switch to one the USB ports at the back of Pearl.
2. When CMS event is in progress, the LED light on the Delcom button is turned on.
3. Press the button to pause the recording.
4. The LED light pulses to indicate that the CMS event is paused.
5. Press the button again to resume event.

Extend or pause an event using the Admin panel

1. From the Admin panel, select the Events menu and then click the button to extend the current event. In this example, the button adds **+5 minutes** each time it is pressed.



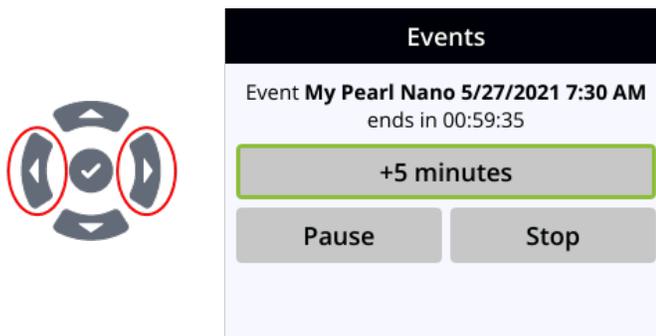
2. If this is a Panopto, Opencast, or YuJa, event, you can select **Pause** to pause the current event.

When paused, the button changes to Resume. When you're ready to continue, select **Resume**.

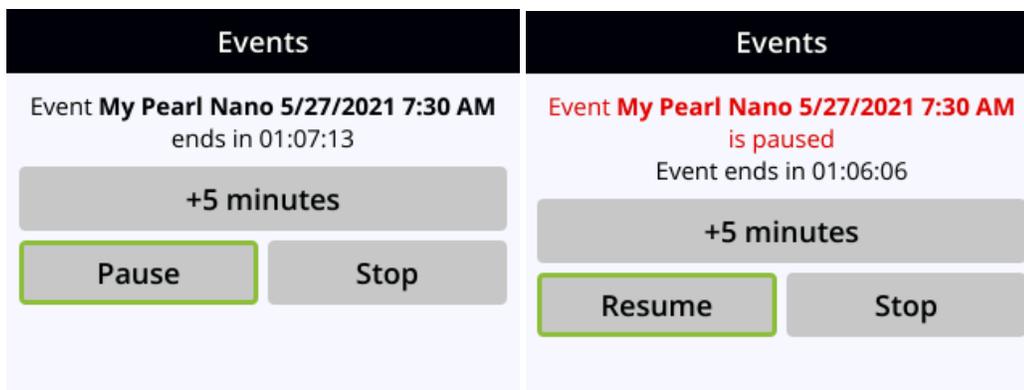


Extend or pause an event using the front screen on Pearl Nano

1. If you don't see the Events screen on the front screen, press the **left arrow** key (or the right arrow key) on the control key interface to cycle through the different views. The Event screen shows the event name and a countdown timer when an event is in progress.



2. To extend the current event, use the arrow and check mark keys to select the button to extend the current event. In this example, the button adds **+5 minutes** each time it is selected.
3. If this is a Panopto, Opencast, or YuJa, event, you can use the arrow and check mark keys and select **Pause** to pause the current event. When paused, the button changes to **Resume**. When you're ready to continue, select **Resume**.



Create ad hoc events using the Admin panel

You can create and start an ad hoc recording or webcast using the Admin panel. Your Pearl device must be registered with your CMS to create ad hoc events, see [Integration](#) .

You must authenticate using your CMS login credentials before you can enter the ad hoc event details and start the event. Contact your CMS administrator if authentication fails and login is denied.



User accounts must be defined on the CMS itself and not a subsidiary system such as an LMS.

Kaltura event details

Table 70 Kaltura ad hoc event details

Item	Description
Event owner	The event owner will be the email connected to your Kaltura account.
Full name	The full name associated with the Kaltura account.
Admin owner	Select a Kaltura user group from the drop down list. The groups listed here are groups that the event creator is a member of. Kaltura groups must be enabled from the Kaltura settings page. For more information, see Kaltura settings .
Session title	Enter a unique name for the ad hoc event. If no name is entered, a default event consisting of the current date and time is applied. For example: 2019-07-04 13:22
Description	Enter a description of the event.
Tags	Add Kaltura search tags separated by commas. For example: tag1, tag2, tag3.
Category	Add a Kaltura category.
Duration	Select the event duration in minutes from the drop down list or enter a value using your keyboard. Select a value from 5 to 240 minutes or enter a value using your keyboard.
Event type	Choose either VOD (Video on Demand), Live-stream, or VOD + Live-stream as the ad hoc event type.

Panopto event details

Table 71 Panopto ad hoc event details

Item	Description
Session title	Enter a unique name for the ad hoc event. If no name is entered, a default event consisting of the current date and time is applied. For example: 2021-07-04 13:22
Folder	Select the folder in Panopto where you want the recorded file to upload. Your Panopto MyFolder is the default folder. For ad hoc events, the Pearl device ignores a user's presets that are set in Panopto. As a result, ad hoc recordings automatically upload to the user's default folder as originally assigned by Panopto.
Duration	Select the event duration in minutes from the drop down list or enter a value using your keyboard. Select a value from 5 to 240 minutes or enter a value using your keyboard.
Event type	Choose either VOD or Live-stream as the ad hoc event type.

Table 72 Opencast ad hoc event details

Table 73

Item	Description
Session title	Enter a unique name for the ad hoc event. If no name is entered, a default event consisting of the current date and time is applied. For example: 2021-07-04 13:22
Duration	Select the event duration in minutes from the drop down list or enter a value using your keyboard. Select a value from 5 to 240 minutes or enter a value using your keyboard.
Subject	Provide a subject for the event.
Description	Enter a description for this Opencast event

Create an ad hoc event using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Events menu, click **Events**. The Events page opens.

Events

Last updated 14:53, 2021-11-15

[Refresh schedule](#)

Not logged in

[Create new event](#)

Ongoing and completed events

Event	Name	Type	Status
2021-11-15 13:53-13:55	Nov 15 VOD event	VOD	Complete
2021-11-15 13:20-13:23	Nov 15 live event	Live-stream	Complete

Page 1 of 1 ← →

Scheduled events

Event	Name	Type
2021-11-15 14:55-14:57	Epiphan U Session	VOD

Start

Page 1 of 1 ← →

3. Click **Create new event**. A pop-up window appears.
 - a. For Kaltura: In the Event owner field, enter your Kaltura user ID as your CMS login credentials, then click **Login**. After you're authenticated, your user name appears in the **Full name** field and you can enter the ad hoc event details.
 - b. For Panopto: Enter your Panopto CMS user name and password in the login window, then click **Sign in**. In the events details pop up, your user name appears in the **Full name** field and you can enter the ad hoc event details.



If you get the login error that your account is not active, your CMS has blocked your account. If login to the CMS is denied, the account you entered may not exist or may not have access rights to create an ad hoc event using Pearl device. Contact your CMS administrator for CMS related login and account issues.

4. Click **Start event now** when you're ready to start recording or Live-streaming. Or click **Cancel**.

When you're done creating ad hoc events, it's good practice to log out of the CMS so that nobody can use your CMS account to create events using the Admin panel, see [Log out of an ad hoc session](#).

Log out of an ad hoc session

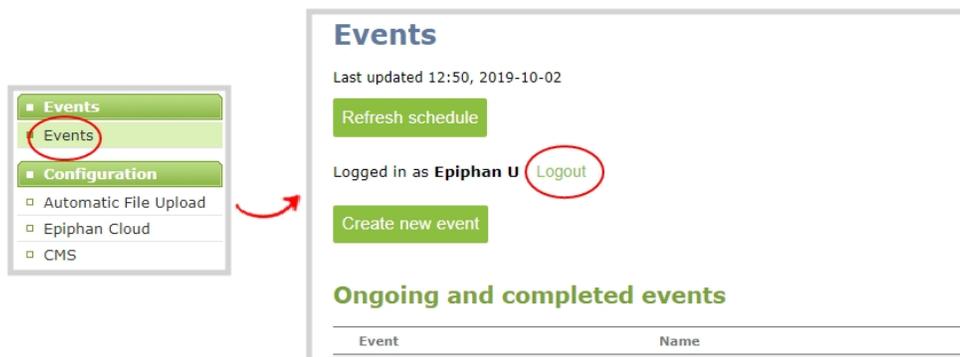
After you've logged into Kaltura from the Admin panel (or touch screen on Pearl 2 and Pearl Mini) and started an unscheduled ad hoc event, your login session stays active for one hour after the event ends. You are automatically logged out after one hour.

For Panopto ad hoc events that you start using the web-based Admin panel, Panopto preserves your login credentials after the ad hoc event ends. To avoid someone else from using your account to create ad hoc Panopto events from the Admin panel, you must manually logout after you're ad hoc event ends and close your session with the Panopto server. Alternatively, you can use an incognito/private browser session with the Admin panel. Then when you manually log out of your Panopto session using the Admin panel and close the incognito/private browser, your Panopto session closes and you are fully logged out.

Before you begin, you need your Panopto server URL, for example:
`https://<myorg>.hosted.panopto.com/`

Manually logout of an ad hoc session with Panopto using the Admin panel

1. From the Events menu, click **Events**. The Events page opens.



2. Click **Logout** beside your login user name.
3. To close the authentication session with the Panopto server, open a new tab in the same browser that you used to login and go to:
<https://<PanoptoServerURL>/Panopto/Pages/Auth/Logout.aspx>



Closing the authentication session with the Panopto server may not close the authentication session with a third-party LMS.

4. Return to the Admin panel and click **Create new event** on the Events page to confirm that you're logged out of Panopto. A blank login page should appear.

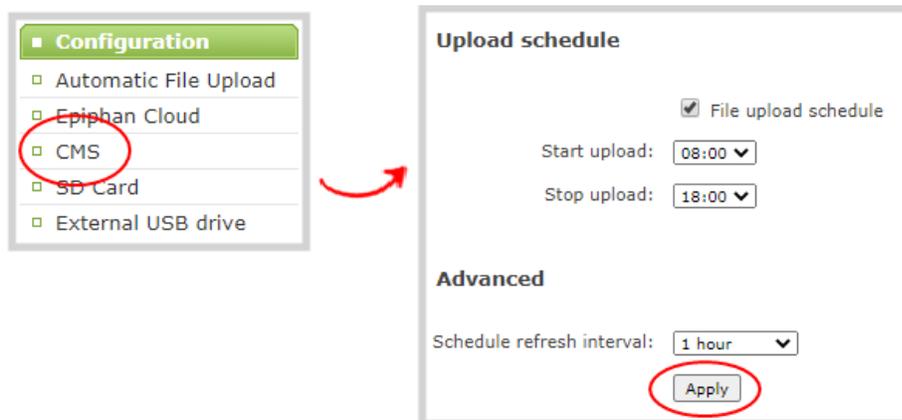
Schedule when CMS event recordings upload

As soon as your Content Management System (CMS) event ends, the Pearl device uploads the associated recordings to the CMS server if a network connection to the CMS server is available. Using the Admin panel, you can schedule the Pearl device to upload recordings only during a specific time period. Recordings made outside the upload time period are queued and only upload when the time to start uploading is reached. This feature is disabled by default.

Schedule when the Pearl Device can upload event recordings using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **CMS**. The Content management system configuration menu opens.

- Under **Upload schedule**, check **File upload schedule** and select the start and stop times of the file upload period. Then click **Apply** at the bottom of the page.



Upload the local Panopto webcast recording

By default, the Pearl device always records a Panopto webcasting event locally and uploads that recording when the webcast ends. Once uploaded, the Panopto server uses the local recording from the Pearl device instead of the original webcast. You can disable this feature using the Admin panel.



The Pearl Mini and the Pearl Nano need a storage solution to use this feature. The Pearl Mini can use an SD card and the Pearl Nano can use an SD card or SATA m.2 2280 SSD.

If an upload schedule is set, the webcast recording uploads during the scheduled upload time period, see [Schedule when CMS event recordings upload](#).

Enable or disable uploading the local webcast recording using the Admin panel

- Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
- From the Configuration menu, click **CMS**. The Content management system configuration page opens.
- Under **Settings**, check **Upload the webcast recording** and click **Apply** at the bottom of the page to always upload the local recording of webcasting events or uncheck **Upload the webcast recording** to disable the feature.

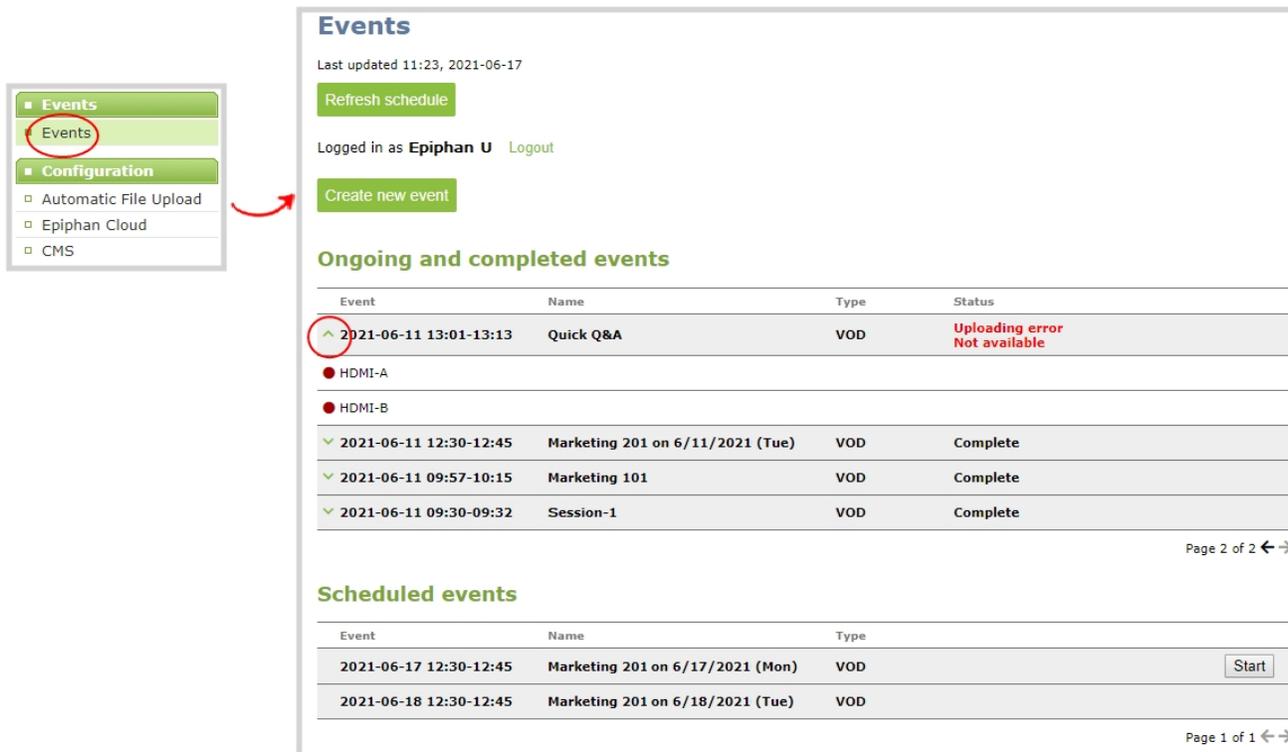
Recover channel backup recordings

Recordings automatically upload to Kaltura or Panopto after the event ends. If for some reason the recordings are not available in the CMS, administrators can manually download backup recordings for a channel on the Pearl device.

Your Pearl device saves a local backup of recordings automatically in a round-robin fashion. When the record drive is full, new recordings overwrite the oldest ones. Pearl administrators and operators can use the Admin panel to manually download and delete channel recordings. For more details about managing recordings, see [Manage recorded files](#).

Download recordings for a channel using the Admin panel

1. Login to the Admin panel as **admin** or **operator**, see [Connect to the Admin panel](#).
2. From the Events menu, click the arrow icon beside the event to see which channels were included for that event.



3. From the Channels menu, click **Recording**. The Recordings page for that channel opens with a list of recorded files.
4. Click the name of the recording to download the file or select multiple files and click **Download Selected**.

Recorded Files

	File Name	Start	End	Duration	File Size	
May 23	<input type="checkbox"/> HDMI-A_May23_10-12-05.mp4	10:12:05	10:12:06	1 seconds	0.00 MB	<input type="checkbox"/>
	...					
	<input type="checkbox"/> HDMI-A_May23_10-11-36.mp4	10:11:36	10:11:36	0 seconds	0.00 MB	<input type="checkbox"/>
	...					
	<input type="checkbox"/> HDMI-A_May23_08-05-11.mp4				9.25 MB	<input type="checkbox"/>
	<input type="checkbox"/> HDMI-A_May23_07-53-24.mp4	07:53:24	08:05:11	11m 47s	499.25 MB	<input type="checkbox"/>
	<input type="checkbox"/> HDMI-A_May23_07-41-37.mp4	07:41:37	07:53:24	11m 47s	499.25 MB	<input type="checkbox"/>
	<input type="checkbox"/> HDMI-A_May23_07-29-50.mp4	07:29:50	07:41:37	11m 47s	499.25 MB	<input type="checkbox"/>

To download one file, click the file name.

To download several files, select them and click "Download Selected".

Delete recordings for a channel using the Admin panel

To delete recordings for a channel, do one of the following:

- To delete a single recording, click the X icon to the right of a recording and click **OK** when prompted.
- To delete multiple recordings, check the check box beside the recordings you want to delete and click **OK** when prompted.
- To delete all recordings for the selected channel, click **Delete Selected** and click **OK** when prompted.

Recorded Files

	File Name	Start	End	Duration	File Size	
May 23	<input type="checkbox"/> HDMI-A_May23_10-12-05.mp4	10:12:05	10:12:06	1 seconds	0.00 MB	
	<input type="checkbox"/> HDMI-A_May23_10-11-36.mp4	10:11:36	10:11:36	0 seconds	0.00 MB	
	<input type="checkbox"/> HDMI-A_May23_08-05-11.mp4	08:05:11				
	<input type="checkbox"/> HDMI-A_May23_07-53-24.mp4	07:53:24	08:05:11	11m 47s	499.25 MB	
	<input type="checkbox"/> HDMI-A_May23_07-41-37.mp4	07:41:37	07:53:24	11m 47s	499.25 MB	
	<input type="checkbox"/> HDMI-A_May23_07-29-50.mp4	07:29:50	07:41:37	11m 47s	499.25 MB	

Download Selected To delete files, select them and click "Delete Selected". Delete Selected Delete All

To delete all files, click "Delete All".

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).

Maintenance

Keep your Pearl Nano running smoothly using the latest firmware updates and maintenance features.

Topics include:

- [Power down and system restart](#)
- [Back up your Pearl device setup](#)
- [Perform a factory reset](#)
- [Firmware upgrade](#)
- [Support](#)
- [Register your device](#)
- [Storage capacity and maintenance](#)

Power down and system restart

You can do the following to power off Pearl device or reboot the device:

- Choose **Reboot** from the Maintenance page using the Admin panel.
- Reboot using the front screen menu.
- Power off the device by removing the power adapter cable attached to the rear panel of Pearl Nano.

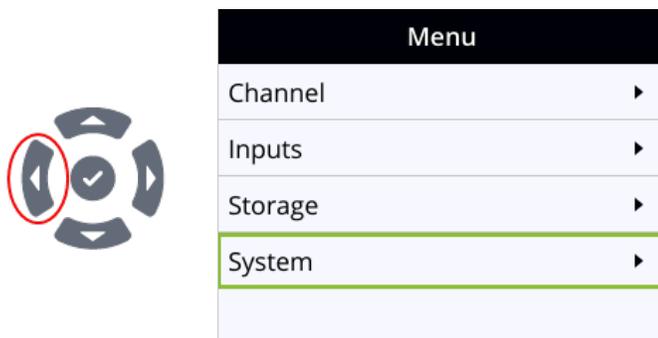
Reboot the device using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Maintenance**. The maintenance page opens.
3. Under the **Maintenance** section, select **Reboot Now** and click **OK** when prompted.

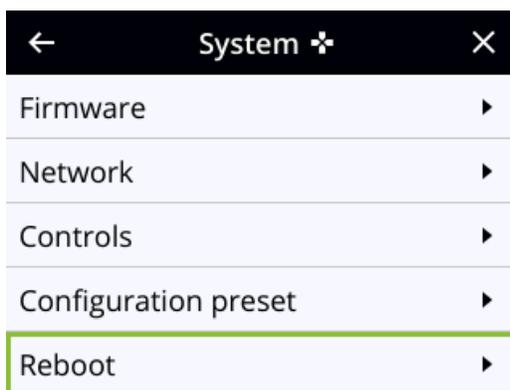


Reboot the device using the front screen menu

1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **System**. Then from the System screen, scroll down using the arrow key and select **Reboot**.



3. Press the **check mark** key to select **Reboot now** when prompted.

Back up your Pearl device setup

Configuration presets are the perfect way to back up your Pearl device setup so that you can reapply it later without worrying if someone changes your settings or does a factory reset.

You can create a configuration preset from the Configuration menu when you select **Maintenance**, see [Configuration presets](#).

Create a configuration preset

Name:

Sections

- System
- Network
- Inputs
- EDID
- Channel
- Automatic File Upload
- Content Management System
- Epiphan Cloud
- Front screen
- Output port

Perform a factory reset

Administrators can use the Admin panel to perform a factory reset and restore the configuration of Pearl Nano to the manufacturer's original default settings. For a list of affected settings, see [The Factory default configuration preset and Factory reset](#).

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

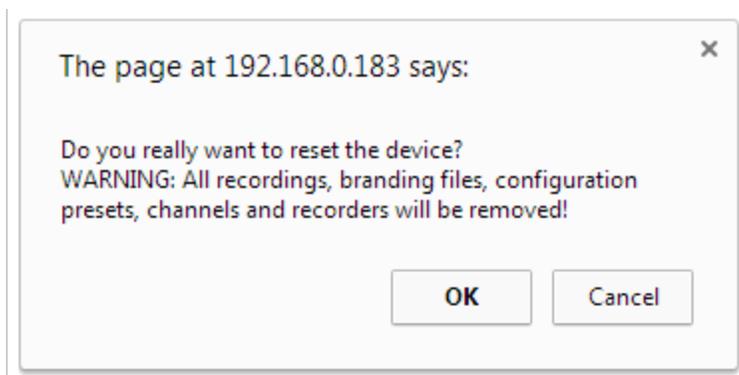
Consider applying a factory default configuration preset if you want to preserve your uploaded media files, configuration presets, and channel recordings, see [Configuration presets](#).

Perform a factory reset using the Admin panel

1. Login to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Maintenance**. The maintenance page opens.



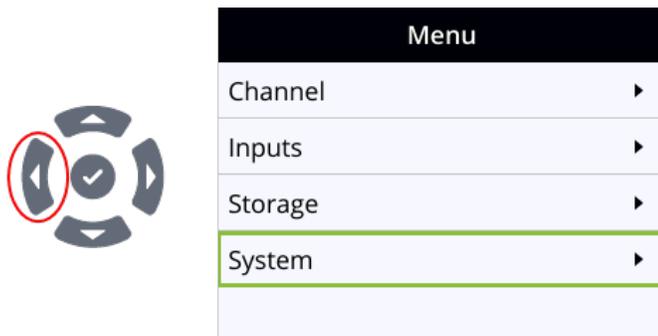
3. Under the **Maintenance** section, select **Reset** and click **OK** when prompted.



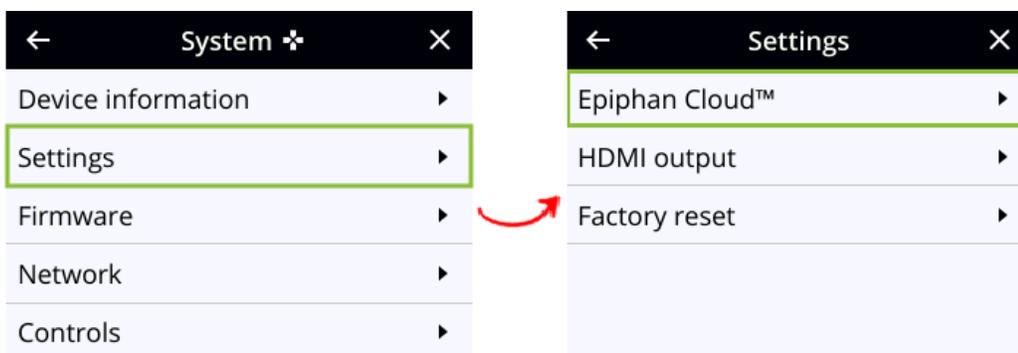
4. The device resets to factory defaults and reboots. Wait for the system to finish rebooting before configuring Pearl Nano.

Perform a factory reset using the front screen menu

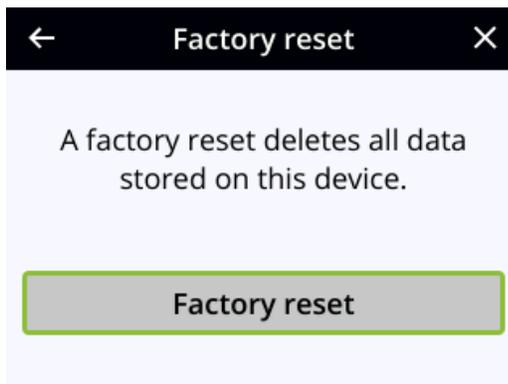
- 1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



- 2. Use the arrow and check mark keys to select **System**. Then from the System screen, select **Settings** to open the Settings screen.



- 3. From the Settings screen, select **Factory reset** to open the Factory reset screen.



- 4. Select **Factory reset** using the **check mark** key to reset to the factory settings.

Firmware upgrade

When you register your product with Epiphan, you can choose to receive email notifications whenever firmware updates are available. To take advantage of exciting new features and important fixes for your

Pearl device, install new firmware whenever the system indicates that a firmware update is available.

Topics include:

- [Firmware upgrade](#)
- [Update the firmware](#)

Check for firmware updates

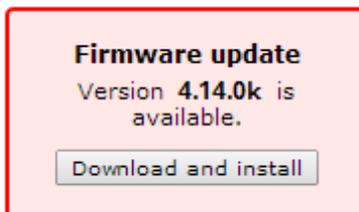
Your Pearl device automatically checks for firmware updates if the **Enable connection to maintenance server** option is checked on the **Maintenance** page of the Admin panel. You can also manually check for updates if your Pearl device has internet access. Don't miss out on any feature enhancement. Register your Pearl device and be eligible to download firmware updates, see [Register your device](#).



When **Enable connection to maintenance server** is checked, the built-in firmware update mechanism checks for updates for your specific product and hardware version automatically.

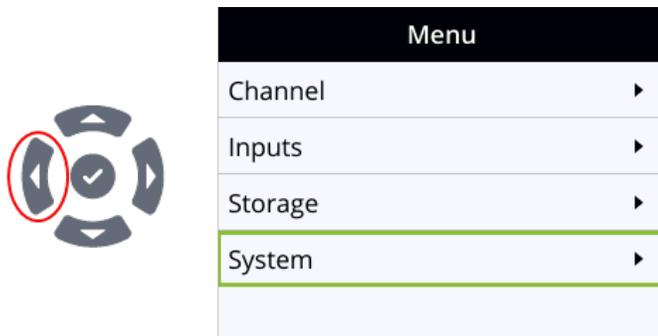
Manually check for new firmware using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Firmware Upgrade**. The firmware upgrade page opens.
3. Click **check for updates** beside the current firmware version. If an update is found, a red box appears in the top left side of the Admin panel with a link to download and install the firmware.



Manually check for new firmware using the front screen menu

1. Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



2. Use the arrow and check mark keys to select **System**. Then from the System screen, scroll down using the arrow key and select **Reboot**.



3. Press the **check mark** key to select **Reboot now** if prompted.

Update the firmware

If your Pearl Nano has internet access, the easiest way to install a firmware update is to use the download link that's provided when you check for new firmware. If you have a Pearl Nano firmware file that was provided to you by Epiphan Video, you can install the new firmware using the web-based Admin panel.



You cannot install new firmware from a locally saved file using the local console on Pearl Nano.

While the firmware is updating, the front screen displays a firmware update in-progress notice, all streaming and recording functions stop until after the firmware upgrade is complete.

Installing new firmware takes a few minutes, after which the system reboots. Depending on the upgrade, a disk rebuild may be required, causing the restart process to take more time. Please be patient and wait for the system to finish rebooting.



Do not interrupt power to the system during a firmware upgrade.

Before you begin

Schedule a time to when you can update the firmware without negatively impacting viewers or automatic file upload and recording schedules.

It's good practice to make a backup of your current configuration before applying a firmware update so that you can revert to the previous firmware if needed, see [Create a configuration preset](#). You should also clear your web browser's cache after the update is complete.

Perform a firmware update using the Admin panel

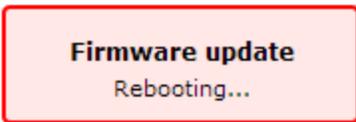
1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. (Optional) Save a copy of the current system configuration. See [Configuration presets](#).
3. From the Configuration menu, select **Firmware Upgrade**. The firmware upgrade page opens.
4. Do one of the following:
 - a. Click **check for updates**. If a red box appears in the top left side of the Admin panel, click **Download and install**.
 - b. Click **Choose File** and select the firmware upgrade file that's located on your admin computer, then click **Apply**. The system unpacks and verifies the file. If the file is valid, the upgrade begins.

A notice that the firmware update is in progress appears on the front screen.



Do not interrupt power to the system during the firmware upgrade.

- When the firmware update is complete, a message lets you know that Pearl Nano is going to reboot. Wait for the system to restart.



- After the system reinitializes, go to the settings for your web browser and clear your web browser's cache.
- Connect to the Admin panel and log in as **admin**, see [Connect to the Admin panel](#).
- From the Configuration menu, select **Firmware Upgrade**. The firmware upgrade page opens. Verify that the firmware version is the expected new version.

If in the rare occasion the firmware update fails, the front screen reports the failure, please collect system information such as the serial number of Pearl Nano, the previous firmware version (if known), and the new firmware version, and contact support@epiphan.com.



Perform a firmware update using the front screen menu

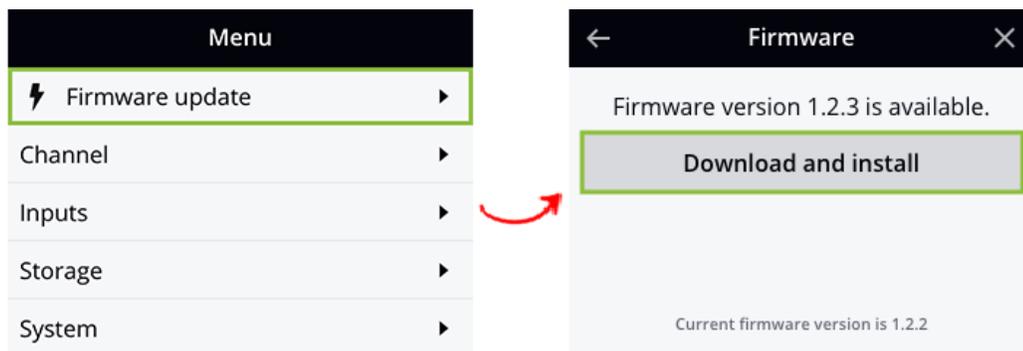
When a firmware update is available, a new option to update the firmware appears on the Menu screen.

- Press the **left arrow** key repeatedly on the control key interface until the Menu screen displays.



Menu	
Channel	▶
Inputs	▶
Storage	▶
System	▶

2. Press the **check mark** key to select **Firmware update** when that option appears on the front screen.



3. Press the **check mark** key to select **Reboot now** if prompted.

Register your device

When you register your product with Epiphan, you become eligible to download firmware updates when they become available. Take advantage of exciting new features and important fixes for your Pearl device. Registering your Pearl device is free and only needs to be done once. You have an option to sign up for email notifications whenever a new firmware update is available.

You can register using the Admin panel or online at: www.Epiphan.com/register

You need the serial number of your Pearl device to register. The serial number appears on a sticker attached to the bottom of the device. You can also see the serial number using the front screen menu when you select **System > Device Information**.



The banner to register your device appears on the Firmware update page in the Admin panel. If your system is registered or there are no firmware updates are available, you will not see a banner on the Firmware update page.

Register using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Firmware Upgrade**. The firmware upgrade page opens.
3. Click **Register** in the banner at the top of the page, then enter the information on the registration form.



Support

Your Pearl Nano comes with a one-year complimentary support plan starting one year from the original product shipment date. You can purchase a 2-year extended support plan from Epiphan Video for a total of three years of product support from the original product shipment date:

- **SupportPlan** offers a 2-year support extension
- **SupportPlan+** offers a 2-year support extension plus remote troubleshooting support

Remote troubleshooting support allows the Epiphan support team to remotely access Pearl Nano to help troubleshoot issues and reset lost admin passwords. No private information is sent to the Epiphan maintenance server during a remote session. For more information about service plans, see www.epiphan.com/supportplan.

To contact Epiphan support:

- **Email:** support@epiphan.com
- **Online chat:** www.epiphan.com/support (Monday to Friday between 9am and 5:00pm EST)
- **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 to download files for support.

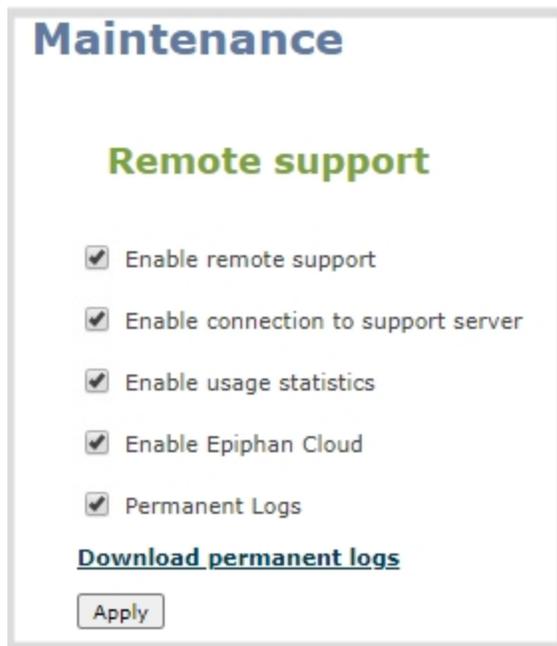


Remote support is only provided for systems covered by SupportPlan+.

Download the logs using the Admin panel

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.

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Maintenance**. The maintenance page opens.



3. Check **Permanent Logs** and click **Apply**.
4. Select **Maintenance** again to refresh the maintenance page and click **Download permanent logs**. A zip file containing system downloads.

Download the allinfo file

1. From your browser, run the **allinfo** script. A file is saved to your computer.

```
Pearl Nano: http://<ip address of your system>/admin/allinfo.cgi
```

2. Share the log files and the allinfo results with Epiphan support.

Configure remote support

Remote support is enabled on Pearl Nano by default and allows the Epiphan support team to remotely access Pearl Nano to help you troubleshoot issues and reset lost admin passwords.

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

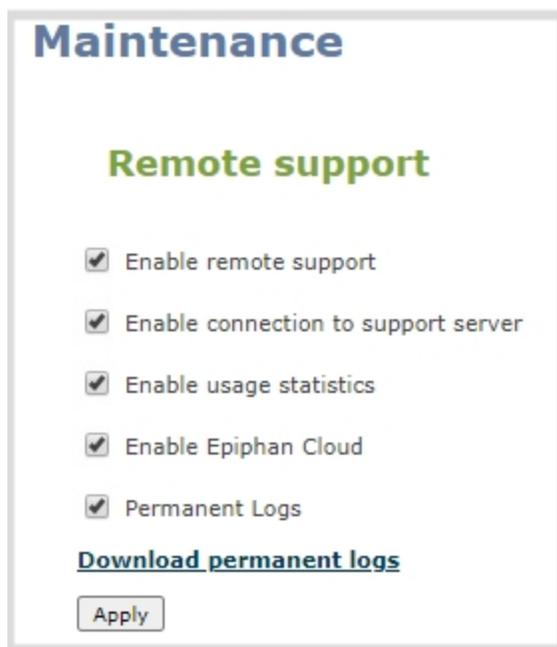
Remote support uses ports 22 and 30. Ensure that these ports are opened to allow remote communication. If your Pearl Nano is on a network that is protected from the Internet by a firewall, consult with your network administrator to configure your network to allow remote Internet access through the firewall for those ports and to add `epiphany.epiphan.com` to the network's allowed list.



Remote support is only provided for systems covered by SupportPlan+. For more information about service plans, see www.epiphan.com/supportplan.

Configure remote support using the Admin panel

1. Log in to the Admin panel as `admin`, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Maintenance**. The maintenance page opens.



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

6. Test that Pearl Nano can access the maintenance server:
 - a. From the Configuration menu, select **Network**.
 - b. In **Network Diagnostics**, enter **epiphany.epiphany.com** and click **ping**.
 - c. The result of the ping should show an IP address for epiphany.epiphany.com. Report any packet losses to Epiphany support.
7. If Pearl Nano can't reach the maintenance server, check the network settings to ensure DHCP is selected or a DNS server is listed, then try again. Consult with your network administrator if problems persist.
8. If Pearl Nano reaches the maintenance server, ensure your firewall has port 30 open.
9. Confirm with Epiphany support that they are able to access your Pearl Nano for remote troubleshooting.

Disable remote support

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



Disabling remote support removes the ability for Epiphany to reset a lost admin password on your Pearl Nano. If you forget the admin password and remote support feature is off, you will need to return the system to Epiphany for reprogramming.

Disable remote support for your Pearl Nano using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, click **Maintenance**. The maintenance page opens.
3. Uncheck **Enable remote support** to disable incoming connections from Epiphany Systems.
4. Uncheck **Enable connection to maintenance server** to disable outgoing links to the Epiphany maintenance server epiphany.epiphany.com.
5. Click **Apply**.

Storage capacity and maintenance

Pearl Nano has support for removable SD cards, which are formatted to use the ext4 file system and can only be read with a computer running Linux. Video recordings that you make are saved to the SD card. You can check how much space you have left on the SD card using the Admin panel and from the front screen.

If you install a SATA M.2 2280 SSD, the SD card is no longer used for recordings and the status of the SD card changes to not detected. Any video recordings that are saved to the SD card no longer appear in the channel's list of recordings and cannot be download using the Admin panel. We recommend that you temporarily remove the SSD until you have retrieved the recorded files from the SD card using the Admin panel.

Pearl Nano also has local storage for internal processes and 6 GB of that space is allocated for uploaded media, like image files that you add to your channel layout. You can see how much space you have for media files from the Media menu using the Admin panel.

Topics include:

- [Check storage capacity](#)
- [Check media storage capacity](#)

Check storage capacity

Using the Admin panel, the amount of available storage space on the SD card is shown at the bottom of the menu panel, as well as on the SD card configuration page.



If a SATA M.2 2280 SSD is installed in Pearl Nano, the available storage space on the SSD is shown at the bottom of the menu panel and the SD card option is removed from the list of Configuration menu options in the Admin panel.

You can also check available storage capacity using the front screen menu on Pearl Nano. The total amount of storage capacity depends on the size of storage device you install.

It's good practice to check how much storage you have available. If the amount of storage is low, you can swap SD cards or remove some of the recorded files, see [Manage recorded files](#) and [Automatic file transfers](#).

Check the storage capacity using the Admin panel

1. Login to the Admin panel as **admin** or **operator**, see [Connect to the Admin panel](#).

- 2. Using the Admin panel, view the **Internal Storage** section at the bottom of the menu panel. The bar will be mostly green if there is lots of space left, or mostly red if storage space is nearly full.



If no SD card or SSD is installed, the following appears:



Check storage capacity from the front screen

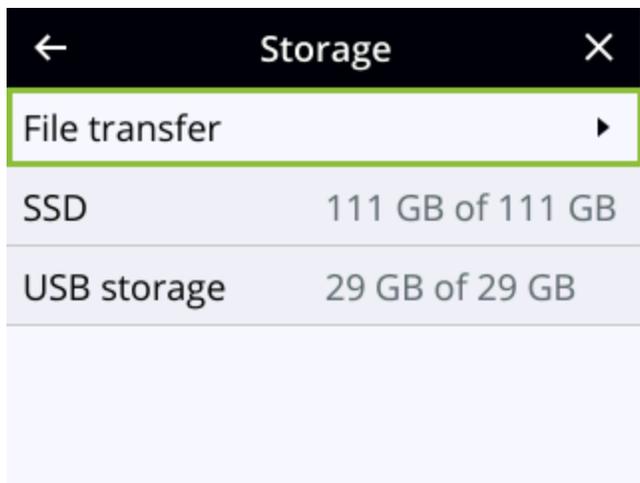
Press the **left arrow** key repeatedly on the control key interface until the System status screen appears. The amount of storage available on the installed storage media is displayed.

System status	
IP address	10.113.1.101
Firmware	4.14.0i
Uptime	07:22
CPU load	9%
SD card	111 GB of 111 GB
USB storage	Not detected



If a SATA M.2 2280 SSD is installed, the SSD storage capacity displays instead of the SD card.

You can also view the storage capacity when you select **Storage** using the front screen menu. A USB storage device must be connected to see the USB storage appear.

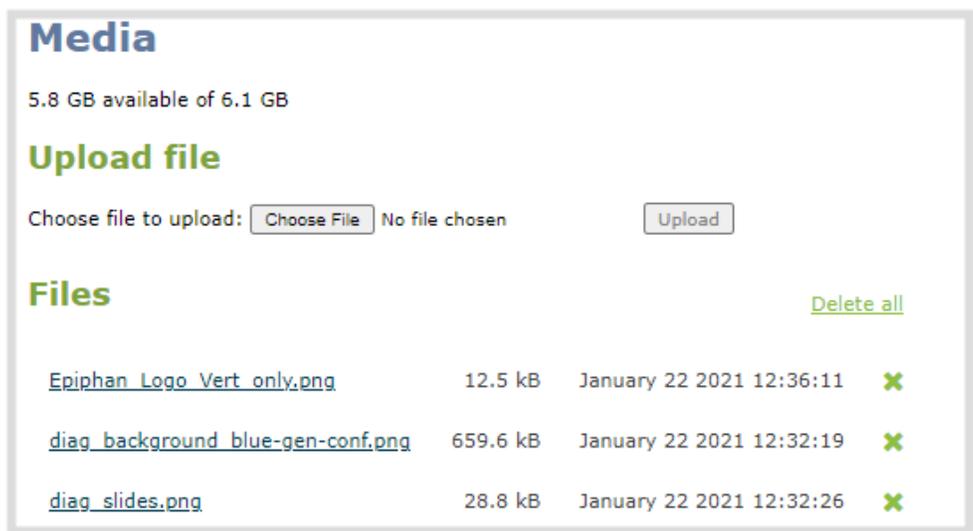


Check media storage capacity

Pearl Nano has 6GB of internal storage that's allocated for uploaded media, like image files that you add to a channel layout. You can see how much space you have for media files using the Admin panel.

Check media storage capacity using the Admin panel

1. Login to the Admin panel as **admin** or **operator**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Media**. The Media configuration page opens with the amount of capacity listed at the top of the page.



Troubleshooting

Pearl Nano has easy-to-use diagnostic tools to test connectivity status, check upload/download bandwidth, traceroute, and more to help you troubleshoot. You can also fine tune channel settings such as frame rate, resolution, and bitrate to ensure optimal use of resources while streaming a quality video and fine tune the video input sources.

Topics include:

- [Diagnostic tools](#)
- [Run diagnostic tests using the Admin panel](#)
- [Run diagnostic tests using the device screen](#)
- [Troubleshooting Quick Reference](#)
- [Remove black bars \(matte\) from the video](#)
- [Use a specific EDID for the video input port](#)



It's good practice to backup your configuration settings so that you can revert back to a good configuration if the changes you made are not desirable, see [Configuration presets](#) .

If your problems persist, there are more resources, including contact information, at [Epiphan Support](#).

Diagnostic tools

Diagnostic tools are available to help you troubleshoot your Pearl device setup and network connection. You can run them using the Admin panel. The Connectivity status diagnostic is also available using the front screen menu.

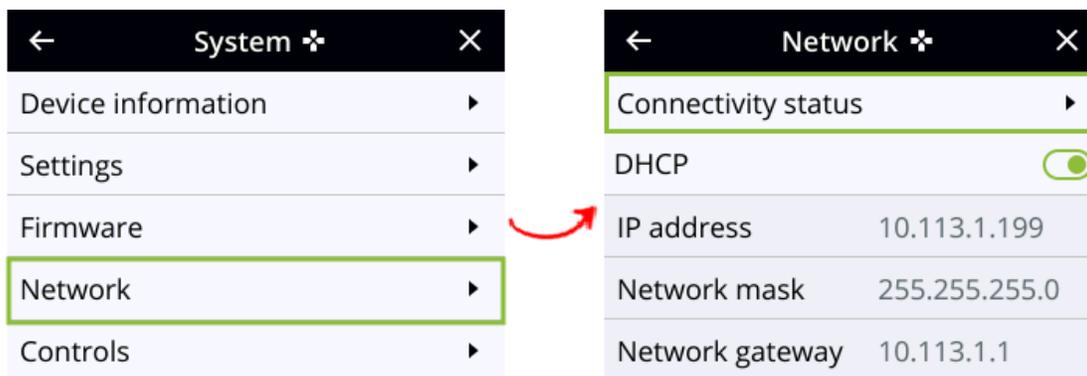
Available diagnostic tools:

- **Connectivity status:** Display the status of critical network connections, see [Connectivity status results](#).
- **Ping:** Test if the Pearl device can reach a specified destination server on the network. Not all networks support ping.
- **Trace route:** Trace the route that packet traffic takes to get from Pearl device to a specified destination server on the network. Not all networks support traceroute.
- **Bandwidth test:** Display the available upload and download bandwidth speed in Mbps.

- **Domain name resolution:** Confirm that the domain name of the DNS server configured on Pearl device is resolvable.
- **Probe:** Check if a network port is open on the network side.

Using the Admin panel, diagnostic tools are accessed from the Configuration menu when you select **Network** and then the **Network Diagnostics tab**. To learn how, see [Run diagnostic tests using the Admin panel](#).

The Connectivity status diagnostic tool can also be accessed from the front screen menu when you select **System > Network > Connectivity status**.



The following table describes what the colored icons in the results indicate.

Table 74 Diagnostic test result icons

Icon	Description
	The diagnostic test result is okay. This can also mean that a specific feature is enabled on Pearl Nano.
	The feature or option is disabled on Pearl Nano.
	The diagnostic test result is not okay. An error was detected.

Connectivity status results

The following table describes the Connectivity status diagnostics results you will see on the Admin panel or the screen of the Pearl Nano.

Table 75 Connectivity status diagnostics results

Diagnostic	Description
802.1x	Report the status of 802.1x negotiation and if the feature is disabled on Pearl Nano. Status results include: disabled, authenticated, in progress, and failed.
DNS	Check if Pearl Nano can resolve host names with their associated IP address using the DNS server that is configured for Pearl Nano. For information about setting a DNS server IP address for Pearl Nano, see Configure a static IP address .
Captive portal	<p>Check for connectivity issues caused by a Captive portal. An okay result can indicate several conditions:</p> <ul style="list-style-type: none"> • No captive portal is detected and Pearl Nano can successfully reach the Internet. • A captive portal is detected and Pearl Nano can successfully reach the public Internet.
Internet	Check if Pearl Nano is connected to the Internet by sending a ping to IP address 8.8.8.8 on the Internet.
HTTP (port 80)	Check if traffic can be sent and received over the network using HTTP port 80.
HTTPS (port 443)	Check if traffic can be sent and received over the network using HTTPS port 443.
Support server	Check if the connection to the Epiphany support server is enabled and if enabled, confirm that Pearl Nano can establish communication with the server. A successful connection is required to use the Epiphany Edge remote login feature.
Epiphany Edge™	Check if the Epiphany Edge remote management feature is disabled on Pearl Nano and if Pearl Nano can successfully connect to Epiphany Edge.
Public IP	Display the public IP address of this Pearl Nano. Knowing the public IP address is useful when configuring SRT on Pearl Nano, especially if Pearl Nano

Diagnostic	Description
	is behind a NAT on the network. An empty result means the IP address was not reported.

From the **Interfaces** tab on the **Network** page of the **Admin panel**, networking information about Pearl Nano is displayed.

- MAC Address
- IP Address
- Network mask/subnet mask
- Default gateway
- DNS Servers
- Hostname
- 802.1x status

If you perform a connectivity test and see errors for **Epiphan Edge** or **Support server** but there are no errors for **Internet**, **HTTP (port 80)**, **HTTPS (port 443)**, and **DNS** then you may need to whitelist certain Epiphan Fully Qualified Domain Names (FQDNs) in your firewall settings. See, [Network ports used by Pearl Nano](#).

Run diagnostic tests using the Admin panel

Using the Admin panel, you can access useful diagnostic tools from the Configuration menu when you select **Network**, and then the **Network diagnostics** tab.

Available diagnostic tools:

- **Connectivity status:** Display the status of critical network connections, see [Connectivity status results](#).
- **Ping:** Test if the Pearl device can reach a specified destination server on the network. Not all networks support ping.
- **Trace route:** Trace the route that packet traffic takes to get from the Pearl device to a specified destination server on the network. Not all networks support traceroute.
- **Bandwidth test:** Display the available upload and download bandwidth speed in Mbps up to a maximum bandwidth of 1000 Mbps.

- **Domain name resolution:** Confirm that the Pearl device can resolve a Fully Qualified Domain Name (FQDN) using the DNS server that is configured for the Pearl device.
- **Probe:** Check if the Pearl device can establish communication to a specific port on a network host using a network protocol that you specify. Supported network protocols are: TCP, HTTP, HTTPS, RTSP, RTMP, and RTMPS.

To troubleshoot networking issues yourself, try to ping the IP address of your Pearl device or do a traceroute to a server such as 8.8.8.8. If you are unable to resolve your networking issues, contact your network administrator and provide them the IP address and MAC address of your Pearl device or contact Epiphany support.

For more information about diagnostic tools, test results, and how to run the Connectivity status diagnostic from the front screen menu, see [Diagnostic tools](#).

Run diagnostics using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).
2. From the Configuration menu, select **Network**, and then select the **Network diagnostics** tab. The **Network Diagnostics** section opens.
3. In the **Network diagnostics** section, select the diagnostic test to run from **Command** drop down.
 - a. If **Connectivity status** is selected, the results display after you click **Run**.
 - b. If **Ping** is selected, enter the destination server IP address or domain name before clicking **Run**.
 - c. If **Trace route** is selected, enter the destination server IP address or domain name to routetrace before clicking **Run**.
 - d. If **Bandwidth test** is selected, the measured upload and download bandwidth displays after you click **Run**.
 - e. If **Domain name resolution** is selected, enter the IP address or server name to resolve before clicking **Run**.
 - f. If **Probe** is selected, choose the transport protocol from the drop-down menu and then enter the destination server IP address or server name along with the port before clicking **Run**. For example, enter: *10.100.10.1:1234* or *domain.example.com:1234*
4. Click **Run**.

Run diagnostic tests using the device screen

You can access a useful diagnostic tool from the device screen when you select **Settings > Network** and select **Connectivity Status**. You can also run other diagnostic tools from the Network page of the admin

panel, see [Diagnostic tools](#).

Available device screen diagnostic tools for Pearl Nano:

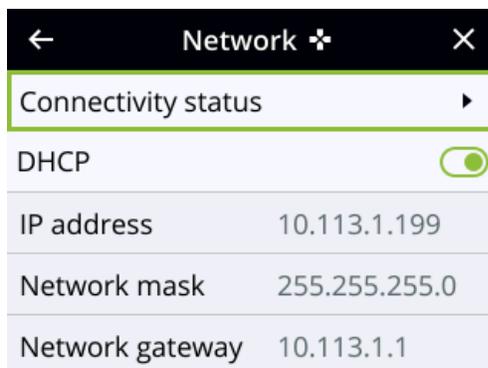
- **Connectivity status:** Display the status of critical network connections and features like 802.1x, see [Run diagnostic tests using the device screen](#).

To troubleshoot networking issues yourself, try to ping the IP address of your Pearl Nano or do a traceroute to a server such as 8.8.8.8. If you are unable to resolve your networking issues, contact your network administrator and provide them the IP address and MAC address of your Pearl Nano or contact Epiphany support.

For more information about diagnostic tools and test results, see [Diagnostic tools](#).

Run Connectivity Status from the front screen

1. Using the buttons on the front of the unit, navigate to the Settings screen.
2. Select **Network**. The Network settings page opens.
3. Select **Connectivity Status** and press the check mark button.



Troubleshooting Quick Reference

Use the follow quick reference table for help if you are experiencing problems or unexpected behavior from your Pearl device.

Table 76 Troubleshooting Quick Reference

Problem	Action(s) to Resolve
4K features not working	The most likely problem is that the 4K Feature add-on is not activated. You can lean more about activating this feature here: 4K
Not sure if the connected video inputs are being captured.	Check each source's input from the source preview in the Admin panel. OR Use the front screen and control key interface and check the screens for each video input source.
No sound is coming from an audio source.	Verify that you are using the correct audio input, see: Configure encoding . OR Use the front screen and control key interface and check the audio meters or use the 3.5 mm headphone jack on the front of Pearl Nano to verify audio, see Confidence monitoring using the front screen .
Captured SDI audio contains audible "clicking" sound or other audio distortions upon playback.	Ensure audio sample rate is set to 48 kHz. Lower sample rates (i.e. 32 kHz and 44 kHz) can sometimes cause audio distortion.
When previewing a channel using the Live broadcast link or the preview link in the Admin panel, some web browsers do not play audio.	The Flash (FLV) plugin must be installed for your web browser to play back audio that's encoded as PCM. Web browsers that use Flash players to preview video do not support audio that's encoded using 48 kHz MP3 or 48 kHz PCM.
All my input names don't look normal in the Admin panel menu after I applied the default preset	Refresh your browser to clear the cache and restore the proper input names displayed in the Admin panel.

Problem	Action(s) to Resolve
Time stamps between Pearl Nano and an RTSP source are not synchronized.	Reconnect your RTSP source to reset desynchronized time stamps. Verify that you are using a local NTP server on your Pearl Nano as a time synchronization server for your RTSP source, see Configure a time server .
There's an audible clicking noise in recordings and live streams of my RTSP video source	Remove the RTSP source using the Admin panel and recreate it to resolve the issue.
Too much noise is present in the audio output.	Check the input level of the audio source to make sure it's the correct level. Modify the input gain if necessary, see Adjust audio gain and delay .
Video playback is fine, but when I play the clip in Adobe Premiere Pro the audio and video are out of sync.	Adobe Premiere Pro has a known issue handling video that is recorded using a variable frame rate. Convert the clip to a constant frame rate using a third-party software, such as Handbrake, before editing in Adobe Premiere Pro.
Adobe Premiere Pro won't load my .mp4 recording from Pearl Nano.	Check if the selected recording format in Pearl Nano is MP4-Fragmented. Adobe Premiere Pro does not currently support fragmented .mp4 files. Before editing in Adobe Premiere Pro, convert the clip to progressive .mp4 format. Run the file through ffmpeg or a third-party software such as Handbrake to preserve both audio and video output.
Image quality is poor or insufficient.	<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. 2. Increase the Bitrate value and/or decrease the Limit frame rate value in the Encoding menu. See: Configure encoding.
Frames per second are lower than expected.	<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 encoding. 2. Reduce the number of actions happening simultaneously on the system (i.e. if streaming, recording, and copying files, consider waiting to copy files until after streaming and recording are complete).

Problem	Action(s) to Resolve
	<ol style="list-style-type: none"> 3. Enter a low negative value (i.e. -5) in the Frame Grabber's Vertical Shift field.
<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: Share a live broadcast stream (HTTP, HTTPS, or RTSP) and Streaming to a media player or smart TV.</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 Epiphany Support at support@epiphany.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. 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>The video streamed to my set-top box is dropping frames.</p>	<p>If you're streaming to set-top boxes that have 10/100 Mbps interfaces on the same Gigabit Ethernet and you notice frames are dropping, you can limit the bandwidth of the stream using traffic shaping to adapt for lower bandwidth set-top boxes and prevent frame drops, see Set up traffic shaping.</p>
<p>Recording won't start.</p>	<p>If recording will not start, check the Disk Status Information to see if the system is out of storage space. See Storage capacity and maintenance and Manage recorded files.</p>
<p>AFU to my CIFS server doesn't work.</p>	<p>Pearl Nano supports Automatic File Transfer (AFU) to CIFS servers (also known as SMB or samba) with samba version 1.</p>
<p>Firmware upgrade fails.</p>	<p>Reboot the system and try again. If the problem persists, contact Epiphany support at support@epiphany.com.</p>

Problem	Action(s) to Resolve
<p>Certain Media players won't play encoded videos but others will.</p>	<p>Depending on the media player used, there could be different issues. If you encounter a playback issue, try using a different media player. Some issues we know of include:</p> <ol style="list-style-type: none"> 1. On Windows 10, the Movies & TV app sometimes fails to playback MP4-fragmented files with MP3 audio: try changing your MP4 audio encoding to AAC. 2. VLC doesn't play MP4-fragmented files normally. 3. Streams and recordings at very low frame rates (e.g. 1 fps) are not playable in VLC media player, use Windows Media Player and Quicktime Player instead.
<p>Certain Media players won't play MOV videos.</p>	<p>Some media players won't play MOV videos that are recorded with MP3 audio encoding, including:</p> <ol style="list-style-type: none"> 1. VLC 2.2.4 (Microsoft Windows) if MP3 audio encoding is at 48 kbps. 2. Movies & TV 10.16122.1029 on Windows 10. 3. Windows Media Player 12. <p>Choose a different audio encoding when recording MOV files or use a different media player to playback the recording.</p> <p>The MOV file type on Pearl also has a time limit of 13h15m, exceeding this limit will render the file unplayable.</p>
<p>There's no audio when I playback an MP4 file in QuickTime 10.</p>	<p>Apple doesn't support MP3 audio. If your MP4 file is created with MP3 audio, you will not hear the audio during playback in QuickTime 10. Choose a different audio encoding when recording MP4 files or use a different media player to playback the recording.</p>
<p>I can't hear the audio in VLC or the video won't play.</p>	<p>VLC version 3.0.3 won't play audio for MP4 fragmented files. In VLC's Input/Codecs settings page, you can try increasing the file caching parameter.</p> <p>VLC version 3.0.6 (windows) won't play MP4 fragmented video files. This is a VLC issue.</p>
<p>There's noticeable latency on the video output port.</p>	<p>Disabling the audio on the video output port improves latency for the port, see Disable or enable audio and output port volume.</p>

Problem	Action(s) to Resolve
System is not starting up correctly.	Ensure there is no USB stick inserted into a USB port during power up. A potential conflict with the internal hard drive could cause unexpected behavior.
I can't register my Pearl Nano with Kaltura using the same device name that I just deregistered.	If you deregister Pearl Nano from Kaltura and then too quickly register again using the same name, you may receive the following error message "Unable to register device: System name [MyPearl] already exists". To avoid this, ensure the deregistered Pearl Nano entry in the list of encoder devices disappears before registering again using the same device name.
My login attempt to create an ad hoc event from Pearl Nano was denied.	Kaltura or Panopto has denied you access to create unscheduled ad hoc recordings and webcasts using Pearl Nano. Contact your CMS administrator to either activate your CMS account or enable the necessary access rights.

Remove black bars (matte) from the video

A channel with only one layout and only one source by default uses the aspect ratio of the video input source when the output is streamed. If the input video signal doesn't match the encoded frame aspect ratio of the channel, bars are added to the sides or top and bottom of the encoded stream when the output is streamed and recorded.

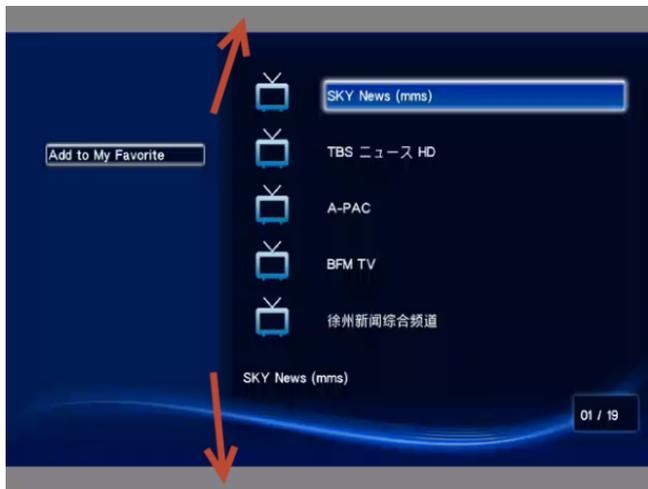
If you see bars on your output but would rather have the image fill the whole screen, you can change the output frame size to match the aspect ratio of the video source at the input, see [Match output frame size with aspect ratio of input signal](#).

The color of the bars (matte) is defined by the Background color that is selected using the custom layout editor for the channel, see [Custom layout configuration](#).

For example:

- Input signal resolution is 720×480 (a 3:2 aspect ratio)
- encoded resolution is 640×480 (a 4:3 aspect ratio that is narrower than the input resolution)

Borders are added to the top and bottom of the image to preserve the wider ratio of the input.



For example:

- Input signal resolution is 720×480 (a 3:2 aspect ratio)
- encoded resolution is 1280×800 (a 16:10 aspect ratio that is wider than the input resolution)

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

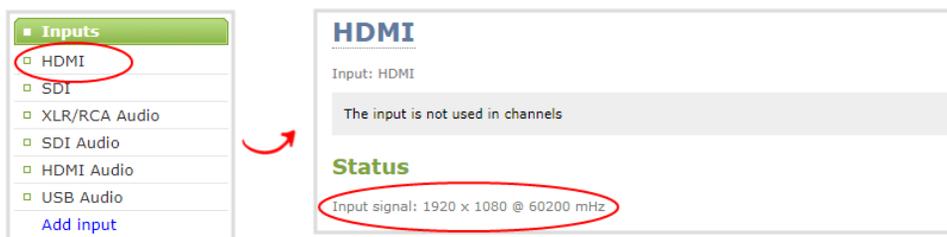


Match output frame size with aspect ratio of input signal

The output frame size is automatically matched only for a layout that has one source. If you have a layout with multiple video sources and see bars on the output but would rather have the image fill the whole screen, you can change the output frame size on channels to match the aspect ratio of the video source to avoid this problem.

Change the output frame size of a channel to match the aspect ratio of the video source using the Admin panel

1. Connect to the Admin panel and login as **admin**, see [Connect to the Admin panel](#).
2. To determine the input port name of the video source that's used in the channel, select the channel from the Channel menu and click **Layout**. The custom layout page opens.
3. Once you have determined the name of the video input source , select the input port for that video source under Inputs menu.



4. Make note of the input signal resolution.
5. From the Channel menu, click **Encoding** for the channel. The Encoding page opens.
6. You can either check **Use current signal resolution as frame size** or you can choose the frame size resolution from the list.
 - a. If the source resolution appears in the list, you can choose any resolution that's listed on the same line (i.e. with the same aspect ratio).
 - b. If the source resolution doesn't appear in the list, calculate the source resolution and enter it in the **Frame size** fields.





TIP: Temporarily check **Use current signal resolution as frame size** to see the frame size listed in the Frame size fields, then uncheck that check box and manually enter the value in the **Frame size** fields.

7. Click **Apply**.

Use a specific EDID for the video input port

Extended display identification data (EDID) is data provided by a video display device, like a monitor. The EDID describes the display's capabilities to a video source, such as the graphics card in a PC or other video output device.

In the Pearl device, the video source uses the EDID information to determine what resolutions, color depth, and other settings the monitor supports.



EDID is crucial for DVI sources.

The video input ports on the Pearl device have a factory set EDID. When you connect a video source such as a laptop or camera to the Pearl device, the video source sees the Pearl device as if it were a monitor. The EDID that's assigned to the input port is read by the video source to determine what video signal it needs to send to the Pearl device.

Usually, the video input ports on the Pearl device correctly emulate a monitor for the connected video source. However, there are times when you may need to upload a custom EDID, like when your source uses a custom set of display properties.

When you upload a custom EDID to an input port on the Pearl device, you can force the port to supply a specific resolution, color depth, etc to the connected video source.

Upload a new EDID

In most cases, the factory installed default EDID works fine for sources connected to the HDMI ports on the Pearl device. However, there may be times when a connected video source uses resolutions that you do not want to use. In that case, you can manually upload an EDID and force the Pearl device to use a specific set of attributes for a specific HDMI input port. All video sources you connect to that HDMI input port will use the EDID you've manually assigned to the port.

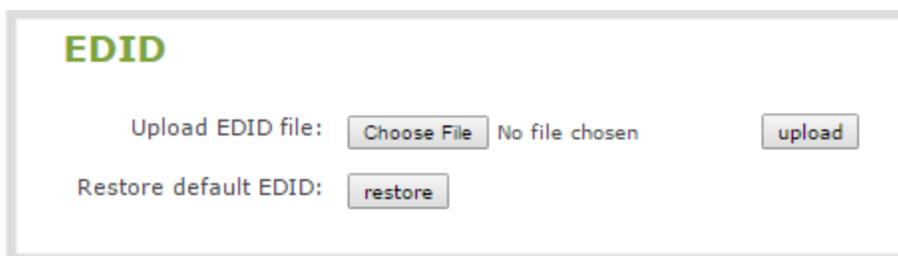
EDID changes remain in effect for the HDMI input port until you replace the EDID with another one or specifically choose to restore the factory EDID for that specific HDMI input port. A system-level factory reset does not remove a manually assigned EDID from the HDMI port.

To get a new EDID, contact Epiphan [Support](#). When you have the new EDID, you can upload that using the Admin panel.

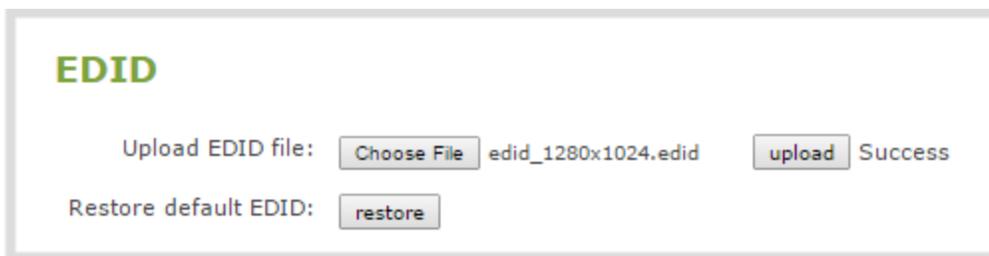
 This feature is not available using the local console on the Pearl Nano.

Upload a new EDID file using the Admin panel

1. Connect to the Admin panel and log in as **admin**. See: [Connect to the Admin panel](#).
2. From the Inputs menu, select the input port for which you want to upload the EDID.
3. On the configuration page for that source, scroll to the **EDID upload** section and click **Choose File**.



4. Browse to the location where the custom EDID file was saved and select it, then click **open**.
5. Select **upload**. When the upload is complete, the page updates to reflect success or failure.



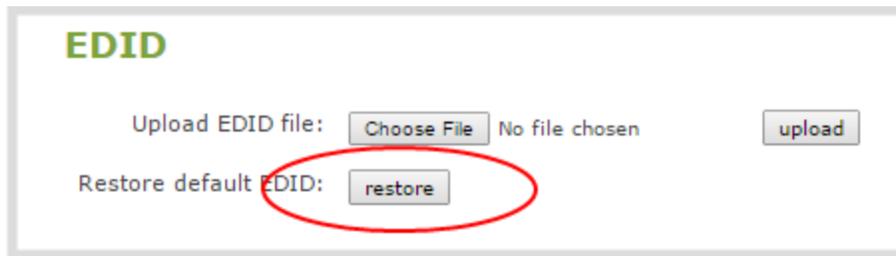
Restore factory default EDID

When you no longer want a custom EDID assigned to an input port, you can restore the input port to use the factory default EDID. Currently there is no way to tell if your input port is using a custom EDID. If you are unsure, restoring to factory default is the best approach.

Restore the default EDID using the Admin panel

1. Log in to the Admin panel as **admin**, see [Connect to the Admin panel](#).

- From the Inputs menu, select the source you want to restore. The source configuration page opens.
- Scroll to the **EDID** section and select **restore**.

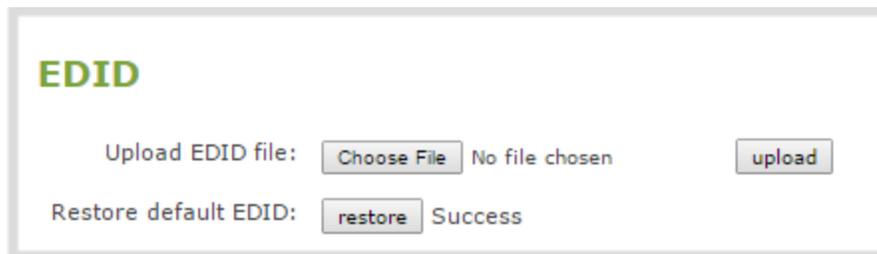


EDID

Upload EDID file: No file chosen

Restore default EDID:

- When the default EDID is applied, the page updates to reflect success or failure.



EDID

Upload EDID file: No file chosen

Restore default EDID: Success

External keyboard shortcuts

You can use keyboard shortcuts with an external USB keyboard that is connected to Pearl Nano. For information about connecting a USB keyboard, see [Connect an external keyboard](#).

Table 77 Keyboard shortcuts available for the different screens

Item	Description
Channel View	
shift+F	Enter full screen and toggle show/hide on-screen items like the status bar.
shift+E	Open the Content Management System (CMS) events screen.
shift+C	Create a new ad hoc event.
shift+P	Open the settings.
shift+R	Start recording the channel and toggle start/stop recording.
shift+T	Start streaming the channel and toggle start/stop streaming.
shift+I	Open the system information screen.
Events screen	
shift+C	Create a new ad hoc event.
shift+S	Start/stop the current event.
Enter	When it is the last text field on a screen, press Enter to move to next screen (if available) or start an action on the current screen.
Space bar	Initiate a button action, accept text entered into a text field, and toggle a switch or check box. Select and initiate a control button action when only one button appears on screen.

Item	Description
	When the last text field on a screen is highlighted, press Space bar to move to the next screen (if available) or start an action on the current screen.
Common to most screens	
Tab	Move to the next input field or control.
shift+Tab	Move to the previous input field or control.
Space bar	Initiate a button action, accept text entered into a text field, and toggle a switch or check box. Select and initiate a control button action when only one button appears on screen. When the last text field on a screen is highlighted, press Space bar to move to the next screen (if available) or start an action on the current screen.
Esc	Cancel unapplied changes on the current screen and return to the previous screen.

Limitations and known issues

This section includes known issues or limitations that affect functionality or usability and ways that you can work around these limitations.

Affecting firmware upgrades to 4.17

- If Pearl power connection is interrupted after a recording has been stopped, but before the Automatic File Upload has finished, Pearl will complete the upload after power has been restored but both the file saved on the Pearl and the file uploaded to the AFU location will be corrupted.
- If you start an event early in YuJa using any Pearl interface and then extend the event, the event appears to extend but ends at the originally scheduled ending time.
- When using the front headphone jack to monitor audio if the touch screen goes dark due to timeout and is then tapped to wake it up sometimes the audio will not return. **Workaround:** Change screens, navigate to a different section of the touch screen and then back to the channel and the audio should resume.
- In Pearl Nano front screen if audio input is not assigned to channel no Gain dropdown box appears. This is expected behavior, Pearl can only modify audio inputs that are encoded in a channel.

Affecting encoding

- **Limitation:** When Pearl Nano is overloaded, video frames or audio samples can be dropped causing variable frame rate and audio cracks.
Workaround: Pearl Nano 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.
- Pearl Nano 1080p 60fps HDMI output may seem shaky at times. **Workaround:** use a lower output frame rate.
- H.265 encoding over SRT from a Haivision Makito encoder cannot be decoded by Pearl Nano.
- **Limitation:** When encoding 720×480i and 720×576i HDMI™ video signals that have a YUV 4:2:2 color space and a bit depth of 24 bits, black visual elements such as a background display as green.
- Changing input settings for an HDMI or SDI input can cause the Pearl Nano's channel to stop working. This includes scaling settings, output resolution or frame rate, and disconnecting/reconnecting an input. **Workaround:** This can be prevented by disabling **Use current signal resolution as frame size** on the **Channel encoding settings** page. Alternatively, restore the channel by restarting the device.

Affecting streaming and recording

- AFU to Amazon Web Services S3 Simple Cloud Storage transfer sometimes does not recover after the network connection is cut. The expected behavior is that the file transfer would restart, but there is sometimes a time desync that results in a failed transfer.

Workaround: If the network connection is severed during a AFU transfer, the process must be restarted from the beginning, and the transfer must proceed without interruptions to the network.

Affecting the Admin panel

- Cropping a video source to 16:9 using the layout editor may not scale correctly and can appear as a thin line in the layout editor. This happens when the device or web browser you're using with the admin interface has a different approach to composing layout. Recording and streaming are not affected.

Workaround: Due to color space limitations (YUV with 2x2 subsampling), the cropped region's dimensions must be set to even values.

- The Status section of the HDMI video input page does not indicate when the video input signal is interlaced.
- Vertically oriented images display horizontally in the layout editor. There is no workaround for this issue.

Affecting CMS integrations

- If the Pearl Nano channel is not selected when setting up the Pearl Nano remote recorder in Panopto, you can still create an ad hoc event using Pearl's Admin panel or front screen; however, the ad hoc event isn't actually created on Pearl Nano or recorded.

Workaround: Enable the channel for the Pearl Nano remote recorder in Panopto.

- If the SD card is removed while a recorded event is uploading to Panopto, uploading is interrupted and the file does not upload; however, the event in Panopto appears as upload complete. If the SD card is immediately re-inserted, Pearl Nano must be rebooted before Pearl Nano will detect it.

Workaround: Wait a minimum of 5 minutes before re-inserting the SD card and rebooting Pearl Nano if the SD card is ejected while files are uploading to Panopto.

- If you modify a particular recurring lecture capture plus live webcasting event (e.g. a VOD + Live Stream event in a recurring series), Kaltura excludes that event from the recurring series and the webcast doesn't stream. That's because the RTMP URLs for the modified event loses its mandatory tokens. However, the recurring Kaltura event does record as scheduled and other events in the series are not affected.

Workarounds: To regenerate the RTMP tokens for a live event, go to MediaSpace, find the modified live event entry and uncheck the Live event checkbox - and save. Then re-check it and save the event again. Alternatively, you can go to the Kaltura Management Console (KMC), find the modified live event entry and then, in the Live stream tab, click **Re-generate Stream Token**.

- Pearl Nano starts a Panopto VOD event without warning that an SD card or an M.5 SSD is not installed and no recording is uploaded after the event ends. **Workaround:** Ensure that Pearl Nano has the appropriate storage medium installed before use.
- When using an external keyboard with Pearl Nano, pressing the Space bar to pause and then resume a Panopto event generates an error message; however, the event does pause and resume as expected. **Workaround:** Press the Enter key to pause and resume a Panopto event when using an external keyboard.
- On the create new ad hoc event screen, the keyboard shortcut **shift+Tab** does not move to the previous input field or control, but moves to the next input field or control. **Workaround:** Press Tab repeatedly until the field you want is highlighted.
- If a Panopto VOD event is left on pause until the scheduled end time of the event or the event is manually stopped while on pause, a recording of the full duration of the event is uploaded to Panopto instead of only the recording up to the point when the event was paused or stopped. **Workaround:** Unpause the event and then manually Stop the event.

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February 26, 2025

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Environmental Information

The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment. In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way. The crossed-out wheeled bin symbol invites you to use those systems. If you need more information about collection, reuse and recycling systems, please contact your local or regional waste administration. You can also contact us for more information on the environmental performance of our products.

Important Safety Warnings

Model numbers covered by this document: ESP1442, ESP1474, ESP1556, ESP1610, and ESP1882

WARNING: Risk of explosion if the power supply is replaced by an incorrect type.

WARNING: This product has no user-serviceable parts and the battery used in this device is not replaceable. Do not attempt to disassemble. Return the device for service.

CAUTION, RISK OF ELECTRIC SHOCK: This device may have multiple AC power cords installed. All power sources shall be disconnected before servicing to avoid shock hazard.

ATTENTION: Risque d'explosion si la source de courant est remplacée par un type incorrect.

ATTENTION: Cet appareil ne contient aucun composant pouvant être entretenu ou réparé par l'utilisateur. En cas de panne, retourner l'appareil pour réparation.

ATTENTION, RISQUE DE CHOC ÉLECTRIQUE: Cet appareil peut être équipé de multiples cordons d'alimentation en courant alternatif. Pour placer cet appareil hors tension, débrancher tous les cordons d'alimentation sans exception.

FCC Compliance Statement

47 CFR Section 2.1077 Compliance Information

Unique identifier: Pearl Nano

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.

Responsible party (US contact):

Epiphan Video
3150 Almaden Expressway
Suite 233
San Jose, CA 94301
USA

Toll free: +1 (877) 599-6581
Phone: +1 (650) 644-4684
Email: info@epiphan.com

www.Epiphan.com

FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Innovation, Science and Economic Development Canada:

This device complies with ICES-003 of the ISED rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme à la norme ISED NBM-003 pour les appareils radio agréés. Son fonctionnement est sujet aux deux conditions suivantes:

(1) Le dispositif ne doit pas produire de brouillage préjudiciable, et

(2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

CE Compliance Statement

Marking by the symbol **CE** indicates compliance of this device with the applicable directives of the European Community and meets or exceeds the following technical standards.

Directive 2014/30/EU - Electromagnetic Compatibility

Directive 2014/35/EU - Low Voltage Directive

Directive 2011/65/EU - RoHS, restriction of the use of certain hazardous substances in electrical and electronic equipment

Warning: Operation of this equipment is not intended for a residential environment and could cause radio interference.



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Thank you for choosing Epiphan!

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

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

Warranty

All Epiphan Video systems have a 100% return to depot warranty for one year from the date of purchase.

Technical support

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

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

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

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