

# EVOLUTION

By Epiphan Video



## FROM VIRTUAL TO HYBRID

THE FUTURE OF LIVE VIDEO



The image shows a modern office building facade at dusk. The building has a light blue-grey metallic finish with a grid of windows. The 'epiphan video' logo is prominently displayed on the upper part of the facade. The logo consists of a green circular icon with a white stylized 'e' inside, followed by the words 'epiphan video' in a white, sans-serif font. The windows are illuminated from within, showing office interiors with desks, computers, and warm lighting. The sky is a deep blue, and the overall scene is captured in a professional, architectural style.

epiphan video

*Photo by Liam Olders*

# Pearl-powered, AI-assisted applications: A call to cloud developers



*Mike Sandler, President & CEO,  
and Misha Jiline, CTO*

Cloud computing is a mainstay of modern business. Documents, media, and software have all taken flight to the cloud. The cloud has even subsumed certain appliances through the virtualization of hardware.

Why cloud technology has taken such hold is no mystery. The cloud is flexible, scalable, and cost-effective. In many ways, the broad buy-in to the cloud is what enabled many companies to continue operations during the pandemic. Indeed, cloud-based workflows were integral to the releases of Epiphan Cloud as well as Pearl Nano, the newest member of our Pearl family of hardware encoders.

No doubt we've reached a tipping point for cloud services (see Epiphan's analysis in the pages that follow of what virtual trends will persist post-pandemic). But should all applications join those great confluences of servers we call the cloud?

Migration makes good business sense in many cases but not all, particularly when it comes to data-rich AV applications. Sending data to the cloud and back expends energy, bandwidth, compute, and other resources that drive costs. Then there are the security concerns inherent to the cloud, which means some tasks must remain local. Ultimately, it's important to consider whether a hybrid solution might be more appropriate, one that sensibly marries cloud processing with local hardware.

Consider a doorbell camera. There is no need to transfer to the cloud all the visual information this device gathers. Instead, an area of interest is defined and then monitored at the hardware level. Should the device detect any motion within this area, only then will it send video to the cloud. This is just one example. There are many more applications – some existing in reality and others only in the imagination – that a hybrid model would serve best.

Of course, what's possible depends largely on the local hardware available. For any developer intrigued by the idea of AI-assisted AV applications, we eagerly put forward our own Pearl systems as hardware platforms. Pearl systems are suited to this for numerous reasons. These are detailed on page 21, along with examples of the potential for this approach.

We hope you find the possibilities of Pearl-powered hybrid applications as exciting as we do. Should you have any questions about Pearl's capabilities in this regard or wish to brainstorm potential projects, we're happy to discuss.

And to all of our readers, we hope you enjoy this latest issue of *EVolution*. May its contents inspire and inform.



# CONTENTS

## **4**     **The Wild West of remote live video production**

In 2020 the music may have stopped, but the show had to go on. Webcasting platforms, live event companies, and live video producers had to step up to keep the world connected remotely. How did they adapt to the new reality? And what will happen after the dust settles?

## **9**     **Why embracing virtual events could reap rewards even after the pandemic**

## **13**    **The future is hybrid: Five reasons virtual events are here to stay**

## **17**    **Pearl Nano primer: Streaming and recording refined**

# 41

Epiphan Video products



21 Untapped potential: Pearl as a platform for AI-assisted AV applications

24 Beyond Ethernet: Networking options for live video

27 A new way to manage your Epiphan devices

31 Pearl underpins remote and hybrid learning at the University of Rhode Island

36 Pearl system buyer's guide: Choosing the best fit for your AV ambitions

41 Epiphan Video products

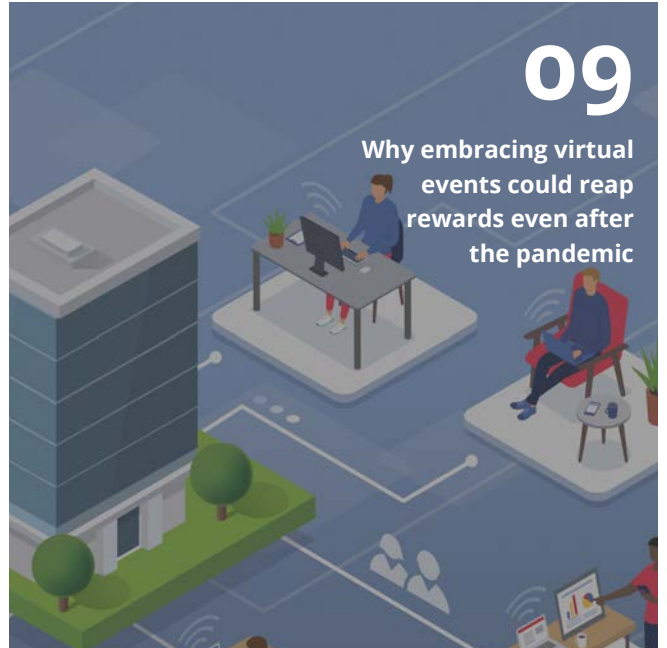
## INSIDE EPIPHAN

45 A message from the pets behind the people behind the products

46 In the spotlight

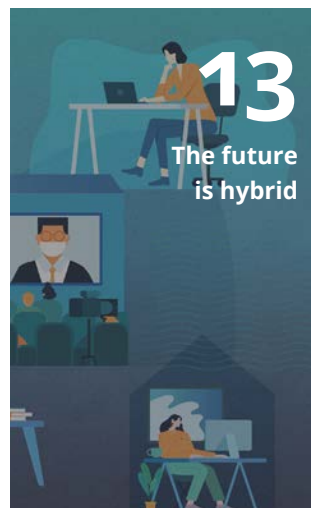
# 09

Why embracing virtual events could reap rewards even after the pandemic



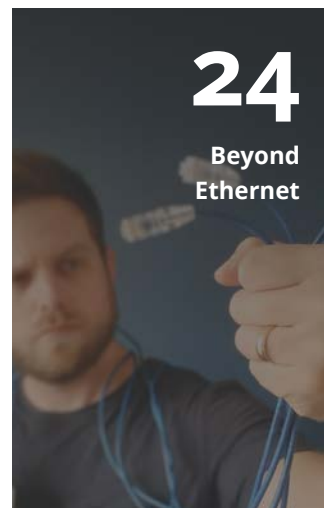
# 13

The future is hybrid



# 24

Beyond Ethernet



# 31

University of Rhode Island case study





# The Wild West of remote live video production

In 2020 the music may have stopped, but the show had to go on. Webcasting platforms, live event companies, and live video producers had to step up to keep the world connected remotely. How did they adapt to the new reality? And what will happen after the dust settles?

Remote video production and virtual events aren't new concepts. Even before the pandemic, both offered real benefits but were widely seen as niche solutions. But in the context of a global pandemic, virtual event and remote production services became essential. Companies engaged in video production, live streaming, webcasting, and event production – as well as new players – all rushed to help translate in-person events to virtual ones. In 2020, they invested heavily into developing remote workflows, defining their offerings, and managing client expectations.

# Key players in the remote production industry and their pandemic journeys

## Online webcasting platforms

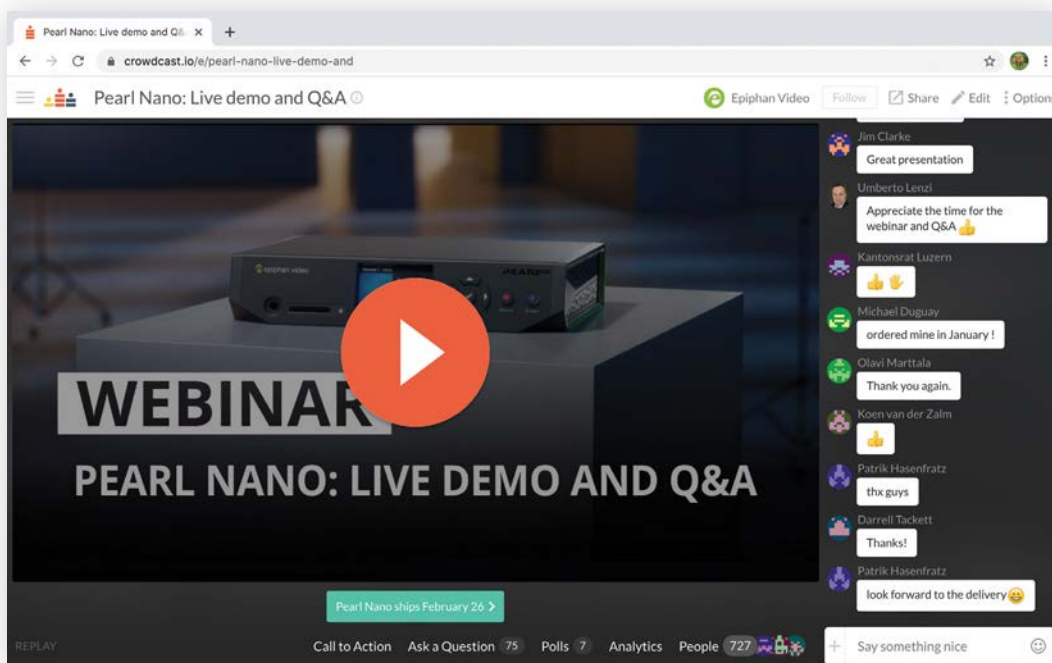
Self-service virtual event platforms like ON24, Crowdcast, Socio, and Hopin arguably had the smoothest transition to the “new normal.” These platforms were already established with a web-based infrastructure to host virtual events with remote participants and stream live video to a large online audience.



At the beginning of the pandemic, virtual event platforms were the first place businesses turned to stay connected with customers through online summits, virtual conferences, and webinars. Because of the sudden influx of new users, some platforms experienced stream interruptions. Reliability matters, so service providers that were able to scale up fast enough to meet demand saw the most success.

After the initial rush, webcasting service providers began looking at ways to expand their offerings. Some started offering run-of-show and production assistance services. Others focused on improving the overall social experience and viewer engagement. For example, a company called Sococo introduced a visual way to represent virtual breakout rooms, making them feel more like a real office.

The initial pandemic surge gave online webcasting platforms a huge boost. To maintain the positive trend, service providers will need to focus on improving the customer experience and expanding their feature sets. Ways to do this include offering more advanced approaches to video production and video quality, as well as looking into more reliable methods for remote contribution. Timing is key, so instead of building from the ground up, webcasting platforms should expand their integrations and partnerships to help meet these needs.



## Independent event streaming producers

Independent event streaming producers are niche operators who focus solely on providing professional live production services for in-person, online, and virtual events. One such company is MSAVi Pro. For over seven years, this company has been honing its skills to deliver high-quality live video to clients without fail. Historically, MSAVi Pro had often worked in tandem with video production companies to render streaming services for events of various sizes.

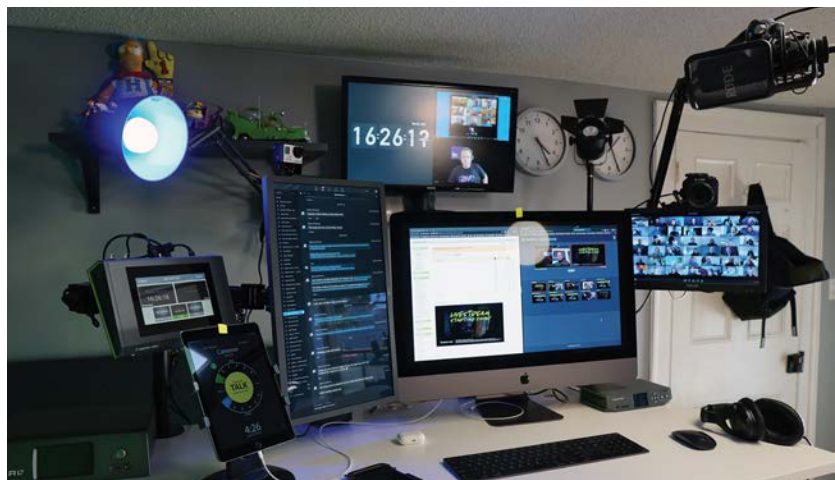
Besides on-location live video services, MSAVi Pro offered network-based solutions, including remote live switching and remote contribution. To guarantee the highest quality of remote contribution, it shipped pre-configured Epiphan Pearl systems to clients for easy setup.

At the onset of the pandemic, MSAVi Pro was the first place existing clients and video production partners turned for help translating in-person events to virtual ones. In 2020, the biggest challenge for MSAVi Pro was scaling quickly enough to keep up with massive demand while maintaining the same level of professionalism and managing client expectations. Thanks to the company's previous experience with remote production workflows, it was much easier for them to adapt to the new reality.

To continue growing, independent event streaming producers should be prepared to scale their operations up (and down) to keep pace with demand. They should also be focused on continuing to bridge the gap between client expectations and the realities of network-based production.

## Broadcasting companies and studio productions

Before, broadcasting and video production companies relied heavily on physical studio assets and full on-premise AV teams to produce live news and other shows for broadcasting and streaming. Shelter-in-place restrictions hit these productions hard. Companies had to find ways to decentralize their production suites and allow AV staff to work remotely.



To accomplish this, crew members set up workstations at home and collaborated online. When it wasn't possible to relocate equipment, staff operated their equipment remotely. On-screen talent set up at-home filming sets complete with professional lighting and green screens. A robust system of backchannel communications was key to keeping everyone connected during shoots. As time went on, small groups of essential personnel were allowed back on the physical set, but the majority of staff continued to work from home.

Existing AV-over-IP technology made switching to decentralized remote workflows easier. Individual production roles like sound mixers, GFX and EVS operators, and producers now had full workstation access from home. Crew members remotely contributed to a central production hub.

One early challenge was controlling remote contribution video quality and signal reliability. Some companies addressed this challenge by shipping all-in-one production kits with network bonding capabilities to remote guests.

Broadcasting companies were pushed hard to adapt to remote workflows. However, during this process, they realized what tremendous savings are possible by decentralizing their staff and virtualizing their studios. It would be wise for studio productions to continue to reap these benefits even after the pandemic. Under this decentralized paradigm, the main goals will be to continuously refine remote infrastructures and optimize internal team communications.





## Live event production companies

Before the pandemic, event production companies like Freeman AV and M Events focused on creating powerful event experiences at large venues. These companies were the one-stop-shop for organizers with an appetite for grand events. Providing live streaming services was just a small part of their overall offering.

Event production companies relied heavily on in-person conferences, trade shows, and conventions to provide services. The sudden cancellation of these events dealt a significant blow. Nevertheless, event technology companies employed their tried-and-true “make it happen” approach and began helping existing clients adapt to virtual events. They first thought about ways to translate the sensory richness of an in-person event to deliver the best possible virtual experience. Then, they identified the tools and services that were suboptimal or missing, including video conferencing integration, an online event platform, remote run-of-show services, and remote contribution kits, and added them to their toolbox.

Undoubtedly, pivoting efficiently was the biggest hurdle for event technology companies. But sticking to what they do best was what brought them success. Learning how to find reliable partners, embrace integrations, and outsource missing services to guarantee an excellent customer experience is where they should be headed. This wealth of experience running large-scale virtual events will prepare these companies for hybrid event production, which is likely to be a significant part of future event offerings.

## New players

In times of change, new players will enter the market by identifying unique pain points and offering custom solutions. In this case, new product and service providers responded to the acute pain of large businesses looking for custom remote live production and virtual event solutions.

As they say, necessity breeds invention. Rookie production startups began to disrupt the market by offering hassle-free remote production experiences. These products and services included everything from mail-in remote contribution kits to full-service remote production studio installs. A lot of these solution providers came from the in-person video production industry, which means they brought with them tremendous expertise.

Many established companies were successful in meeting client expectations. Still, others came up short. Seasoned industry professionals began hearing stories of failed streams. In one case, a large company lost a virtual event stream because the producer didn’t account for the audience size, which eclipsed the capacity of their content delivery network of choice.

New players will have to work twice as hard to compete and succeed in an established industry. Their short-term goals might include learning how to critically evaluate their ability to deliver. It’s also clear that there is a lot of potential to introduce truly innovative remote production products and services that may someday become industry standard.

## When the dust settles

The process of going back to in-person events will be slow and gradual. Virtual events – as well as remote production – are likely to stick around for a while. And as we leave the pandemic behind, the knowledge gained about the benefits of remote participation will inform the future of event planning. It's fair to say hybrid formats are poised to become a fixture of mainstream event offerings.

Although the timeline is uncertain, it is clear service providers will need to adapt and leave room to scale. They'll need to continue to refine their offerings, be open to new partnerships and integrations, and invest in reliable tools. Investing in solutions that support remote production and can fit a variety of cases can keep service providers ahead of the game.



### All-in-one live video production systems

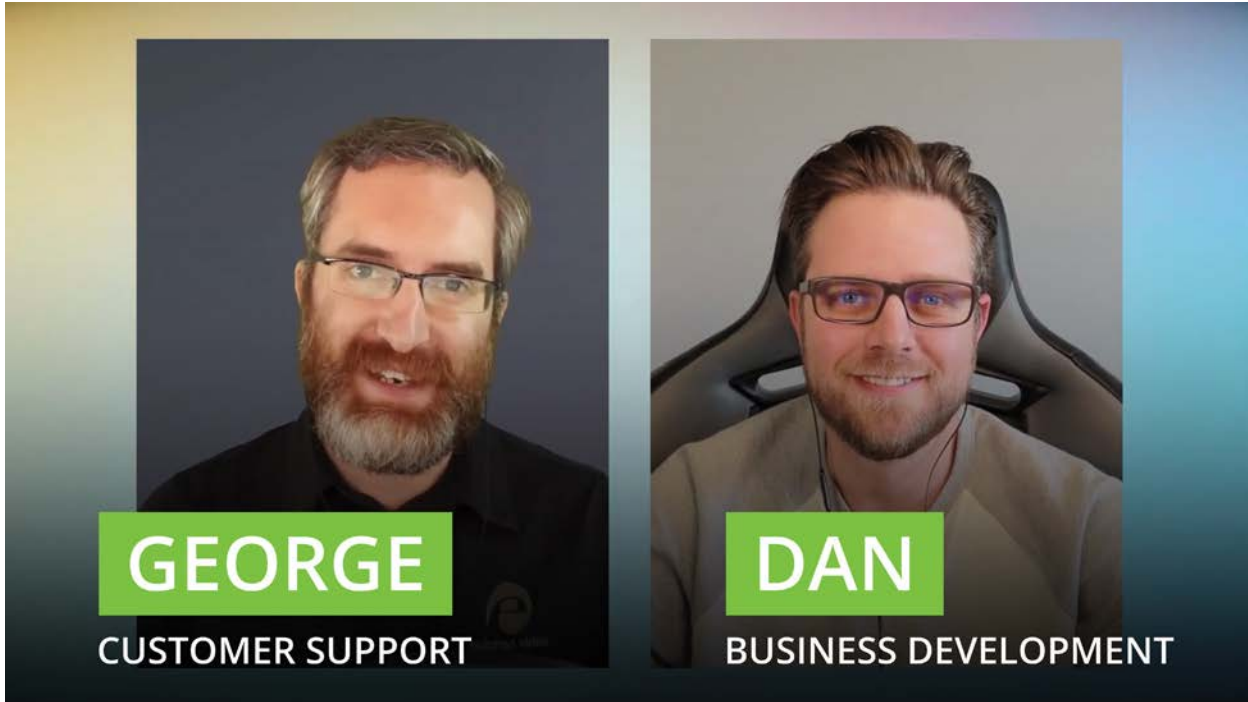
At the heart of any successful virtual production is reliable remote contribution. Pearl hardware encoders make remote contribution easy. Pearl systems support the modern Secure Reliable Transport (SRT) streaming protocol, which can reliably stream high-definition video even over unpredictable networks.

Visit [epiphan.com/products](http://epiphan.com/products) to learn more. Turn to page 36 for a Pearl systems comparison.



# Why embracing virtual events could reap rewards even after the pandemic

By Mike Sandler, President & CEO, Epiphan Video



Before everything changed in 2020, many companies had already caught on to the idea of live streaming as a vehicle for a range of business activities. There's evidence of this in Kaltura's 2018<sup>1</sup> and 2019<sup>2</sup> *State of Video in the Enterprise* reports, which chart a rise in companies using live video for things like employee training and company event broadcasting.

Then came the pandemic. Some companies found a lifeline in live streaming. No longer was live video "nice to have" as an augment to in-person activities; now it was mission-critical. Yet others remain reluctant to embrace live video, holding strong to reservations that I've heard time and again in my conversations with business owners. "It takes too long to get started," they say. "There's little room for error during filming" is another refrain. And, most pertinent for any profit-seeking venture, "the ROI of live video is difficult to prove." These concerns are not without warrant. But as with so many other projects businesses embark on, the payoffs can offset the initial pains.

The benefits of live streaming for external applications are well charted, and I have seen in my own company what value live streaming can bring both during this pandemic and outside of it. As a video production solution provider, we readily ramped up our live video production efforts to keep connected with our customers and business partners in the absence of in-person events. But even we were surprised at what an effective tool live video proved to be for growing our online following, creating real engagement, and, most importantly, building deeper relationships with customers.

Live video will remain a cornerstone of our marketing and sales activities even after the pandemic is behind us. I suspect the same will be true for a good number of companies that initially pivoted to live streaming to stay afloat.

If you're not yet sold on the concept for your own business, consider my account yet more evidence of the need to take a long look at live video and strongly consider its place both today and in a post-pandemic world.

1 Kaltura. *The State of Video in the Enterprise 2018*. November 2018.

2 Kaltura. *Video and Learning at Work: The State of Video in the Enterprise 2019*. November 2019.

## The rapid rise of virtual

When stay-at-home orders went into effect in early 2020, businesses reliant on in-person transactions had little choice but to transition to virtual formats. Educators, fitness trainers, entertainers, and many others turned to video conferencing and live streaming solutions to keep business going. A substantial number had to scramble to find the necessary equipment and learn how to use it. No doubt many wished they had investigated such solutions sooner.

Even companies that do most of their business online and over the phone had to adapt. Those like ours depend on in-person industry events such as trade shows and conferences for opportunities to network, train partners, and market new products. All had to go virtual.

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*Our webinar series generated more than 500 viable sales opportunities. These results are comparable to those we're used to seeing with in-person events, but achieved at a fraction of the cost and effort.*

## Taking the virtual reigns

Event organizers were quick to fill the void with virtual events of all kinds. We found these offered limited opportunities in terms of on-air time and live promotion. We were also mindful of the online event fatigue that can affect viewers who've had to sit through multiple live discussion panels and pitches from various vendors. For us, the solution was to handle the hosting ourselves.

We devised a series of webinars offering informative content to help attendees succeed during these unprecedented circumstances and beyond. With full creative control over the content, duration, and visual presentation, we were able to stay targeted and focused on our own messaging. We wanted to invite people in for a conversation, open doors, help them succeed. We left ample time for questions and real-time interaction.

## The results: Trust, engagement, and ROI

We ran 40 webinars over nine months, averaging 360 registrations per webinar and totaling over 10,000 live views. These results are impressive especially for a niche company like ours.

We also received tremendous positive feedback from viewers. Aware of the weekly interactive event opportunity, our partners and integrators readily directed customers and prospects to our webinars. Viewers felt more confident in our brand after our product specialists answered their questions live.

Beyond views and clicks, the series generated more than 500 viable sales opportunities. These results are comparable to those we're used to seeing with in-person events, but achieved at a fraction of the cost and effort.



## Virtual events are here to stay

Virtual events can never fully replace their physical counterparts. But as much as we can't wait to attend traditional events again, we also can't ignore what their virtual counterparts bring to the table: lower expenses, zero travel time, the convenience of joining an event from anywhere.

Investing in live video during the pandemic will enable businesses to host virtual events amid cycling stay-at-home orders. But there will also be much use for AV tools and knowledge post COVID. Using live video, companies will be able to broaden their reach by making their events accessible to people who can't or won't travel, or go beyond the physical capacity of a venue.

It's no stretch to suggest that the events of the post-pandemic world are likely to be a hybrid of in-person and virtual formats. For late adapters, the best time to start planning for that post-pandemic world is now.



*This article was originally published on Forbes Technology Council on March 16, 2021.*



# The future is hybrid: Five reasons virtual events are here to stay

Last year, the live event world shifted from physical event venues to online platforms. By now we're all used to virtual conferences, concerts, and trade shows. Yet many of us are craving a return to "reality." Thankfully, with global vaccination efforts in full swing, it's not long before the gradual journey back to in-person events kicks off. But what will live events look like in between?



## Two words: Hybrid events

During this transitional period, hybrid events are poised to take over. It's likely organizers will offer limited numbers of in-person tickets along with virtual participation options to keep attendance high. Understandably, many attendees will opt to participate virtually rather than in person because of health and safety concerns. Still, eventually the balance will swing back to in-person events.

### This raises a couple questions:

- Will in-person events completely phase out their virtual counterparts?
- Are hybrid events just a fad brought on by necessity?

The truth is that there's a future for virtual events beyond the pandemic. Even under ordinary circumstances, adding a virtual attendance component to in-person events offers real benefits.

## 1 Cut costs

On the one hand, with fewer in-person attendees, organizers can save on setup costs. Naturally, event organizers will need to invest in virtual event solutions, but these expenses rarely come anywhere close to venue and rental fees. On the other hand, participants can save time and money on travel and accommodations (2020 showed us what's possible!). It's worth mentioning that less air travel also has positive effects on the environment.

## 2 Boost attendance and increase inclusivity

With a virtual event, attendance isn't limited by venue capacity or even physical location. Organizers can reach just about anyone in the world and augment their participation numbers with virtual attendees. Those attending virtually may become interested in attending in person. Additionally, delivering your event online boosts visibility: attendees share the event through their social networks, giving you more exposure and growing your audience. And with a virtual offering, those who wouldn't otherwise be able to attend gain access to the event, making that event more inclusive.



### 3 Increase influence with international speakers

Just as virtual events enable attendees to join from anywhere, the same goes for experts who can speak at your event. With modern streaming protocols like SRT, you can even bring experts in remotely to the physical event with a high-quality and stable stream.

### 4 Build a new revenue stream

Event organizers can offer virtual attendance packages at various price points based on value. Packages can include special access to curated networking opportunities, keynote presentations, and members-only perks.

A virtual component has potential value for the in-person attendee, too. By subscribing to it, the attendee is free to watch a presentation from a cafe or their hotel room to escape the crowds, and only attend select events in-person.

### 5 Collect better data

The digital domain of virtual events is well equipped for gathering information about attendee behavior and engagement. There are plenty of tools available for everything from lead capture to event check-in. Organizers can get detailed information on which presentations their virtual guests attended, how long they stayed, and how they engaged. This valuable data is more difficult to collect accurately at physical events.




## Hybrid events will become the new standard

According to a report by Bizzabo,<sup>1</sup> more than 95 percent of event marketers agree that in-person events will return. The report also found that “the majority of event marketers are looking for technology that will support both in-person and virtual events.” Going forward, it’s possible that virtual events will become an expected offering alongside their in-person counterparts.

## Engagement is still key

At the same time, the report found that event organizers believe attendee engagement is by far the most important performance indicator for event marketers executing virtual events – and one of the most challenging to achieve. We all know how draining virtual events can be. This is why event runners will have to focus on minimizing technical glitches, maximizing networking opportunities, and creating engaging and meaningful virtual experiences for their online audiences.



**Deliver polished hybrid events with Pearl systems**

One way to minimize technical glitches is to use reliable gear. Pearl systems can help you produce polished, high-quality live streams for your virtual and hybrid events.

Turn to page **36** for tech specs and to learn what Pearl systems can do for your virtual or hybrid event production.

<sup>1</sup> The Bizzabo Blog. *4 stats that point to the future of events after COVID-19*. May 21, 2020.



# Pearl Nano primer: Streaming and recording refined

The newest, littlest member of the Epiphan Pearl product family is here. Pearl Nano packs a ton of power into a compact form factor with ingestion, encoding, HDMI pass-through, and recording capabilities. Read on to find out what else makes Pearl Nano the perfect fit for key applications like SRT contribution and small-scale live event production.

## Fine-tuned for your productions

As a single-channel encoder, Pearl Nano streams and records one video program at a time. But Pearl Nano is like no other product in its class, with features you won't find on any other single-channel system.



### Input variety: Connect pro-quality gear

Pearl Nano simplifies setup by letting you directly connect HDMI and SDI video sources along with professional XLR audio and RCA. There's also an HDMI output for confidence monitoring and an HDMI pass-through for displaying video sources on in-room monitors with zero latency.

### Size and setup: Simplify your productions

Small and lightweight, Pearl Nano is easy to tote around and cost-effective to ship out. The option of Power over Ethernet Plus (PoE+) streamlines setup even further. One less cable and power adapter can really help tame cable chaos, especially for more complex productions, and makes the system more convenient to ship to remote guests.

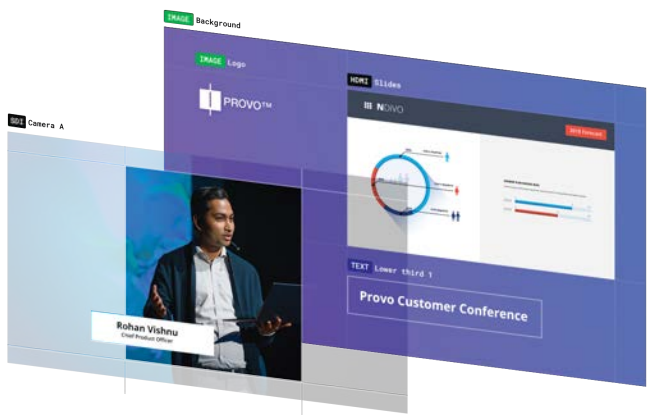
### Custom layout builder: Elevate your video program

Pearl Nano gives you the tools to build a dynamic layout for your video program. Create anything from simple picture-in-picture layouts to rich compositions featuring video backgrounds and custom graphics – whatever suits your event best.

### Front screen: Monitor and control

Like Pearl-2 and Pearl Mini, Pearl Nano has a built-in screen for basic configuration and control. Directional buttons offer an intuitive user experience, and there are dedicated physical buttons for convenient streaming and recording.

The front screen doubles as a confidence monitor for your video and audio sources. Many other hardware encoders in this category deliver a “press and pray” experience, maybe with LEDs to let you know streaming and recording are underway – but this just doesn't compare to being able to verify your sources at a glance.



## Flexible storage: Store recordings your way

A variety of storage options make it easy to record, transfer, and back up files. There's an SD reader like on Pearl Mini, and Pearl Nano can automatically transfer recorded files to a USB drive, local server, or network-attached storage device. And a Pearl family first: add an M.2 SATA SSD to Pearl Nano's expansion bay for more local storage.

## Deep CMS integrations: Pair with Panopto or Kaltura

Comprehensive integration with Panopto and Kaltura makes it possible to start and stop scheduled streaming or recording events right from Pearl Nano's front screen. The system can also push recordings to a user's folder on either platform to save administration time after events.



## A perfect fit for live video applications

As all-in-one video production systems, Pearl-2 and Pearl Mini offer a ton of value. But for some applications, a lot of their features go unused. That's where Pearl Nano comes in.

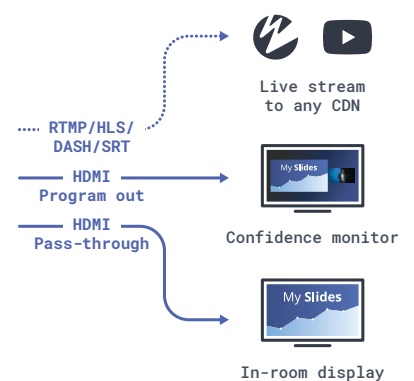
### Small-scale live event production

Compact and purpose-built, Pearl Nano offers all you need for many less-complex productions. Plus, the variety of inputs for video and professional audio, HDMI pass-through, and PoE+ support make setup a breeze.

#### CONNECT YOUR SOURCE

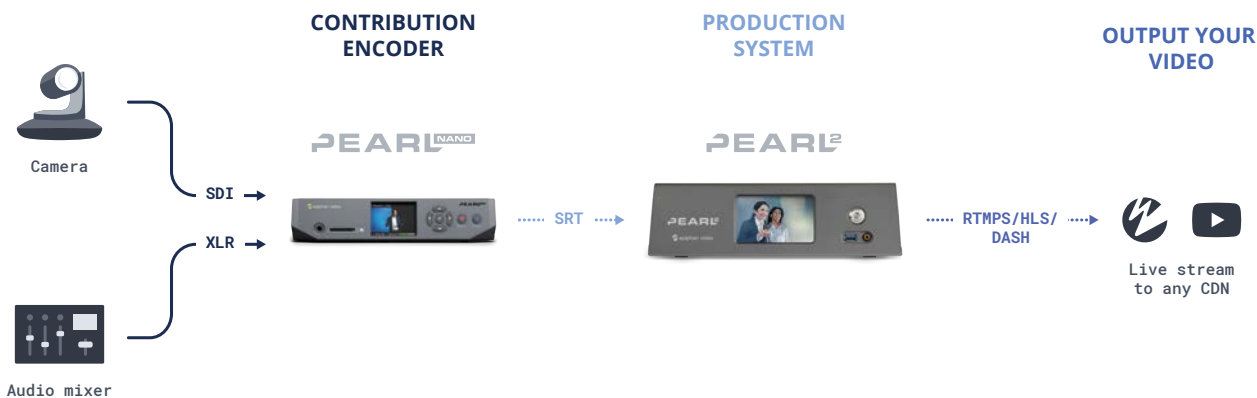


#### OUTPUT YOUR VIDEO



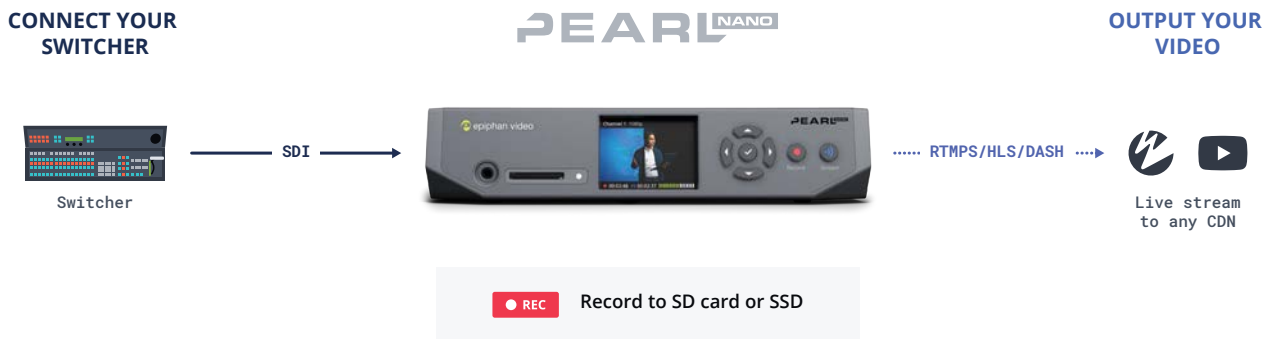
## SRT contribution

Small and lightweight, Pearl Nano is an ideal SRT encoder for shipping out to remote contributors. And with the system being so easy to use, even non-technical users will be able to get set up to send out their SRT contributions without any trouble. Pair with a Pearl-2 production encoder and the producer can even handle all the configuration and testing with end-to-end control.



## Add-on to a full production switcher

A lot of full production switchers lack streaming and recording capabilities. Pearl Nano makes an ideal throwdown encoder for setups like these with advanced, easy-to-use streaming and recording functions, and broad streaming protocol support.



## Bring Pearl Nano to your productions

Check out [epiphan.com/products/pearl-nano](https://www.epiphan.com/products/pearl-nano) for more info on Pearl Nano's features and capabilities. And if you'd like to see Pearl Nano in action, email [info@epiphan.com](mailto:info@epiphan.com) to arrange a one-on-one demo.

# PEARL



## Untapped potential: Pearl as a platform for AI-assisted AV applications

Traditionally, we offer Pearl systems as powerful video streaming, recording, and switching solutions. But Pearl holds additional potential as an edge hardware platform ideal for pairing with cloud processing services. Pearl's powerful AV processing feature set and expansion options present rich development opportunities for AV-based AI and machine learning solutions.

## Versatile and reliable standalone video encoders

At their cores, Pearl systems offer powerful video processing capabilities. Designed from the ground up as H.264 encoding workhorses, Pearls also deliver reliable video capture, scaling, streaming, and recording. All Pearl systems come with a variety of professional AV inputs, including HDMI and SDI video sources, along with XLR audio and RCA. Network-based inputs over RTSP, SRT, and NDI (Pearl-2) are also available, making remote source capture possible.

Pearl hardware supports a range of modern streaming protocols, including MPEG-TS, RTSP, RTMP/RTMPS, SRT, HLS, and MPEG-DASH, making streaming to virtually any destination possible. All Pearl systems can be accessed and controlled remotely through Epiphan Cloud, a cloud-based device management system.

## FPGA for accelerated processing power

From the beginning, the Pearl media pipeline has used a field-programmable gate array (FPGA) to accelerate video capture and encoding. Besides media pipeline task processing, this integrated circuit can be programmed to perform a wide variety of accelerated data processing. FPGAs are a perfect fit for deep-learning applications because they have lower latency and use less power than CPUs or GPUs.



## M.2 expansion bay for AI functionality

Pearl systems feature an M.2 connector for additional storage. However, the M.2 expansion bay can be used for applications other than storage. This opens possibilities for added AI and machine learning functionality. For example, developers could install Google's Edge Tensor Processing Unit (TPU), a purpose-built ASIC chip designed to run machine learning models for edge computing. This TPU is a good fit for deep learning and AI applications because it is highly optimized for large matrix multiplication and addition operations. The Edge TPU is capable of four trillion operations per second while using only two watts of power, making it better performing and more cost-efficient than CPUs and GPUs.

The Edge TPU relies on Google's Coral.ai platform to give developers a complete toolkit for building local AI products. Coral's on-device inferencing capabilities will allow developers to create solutions that are efficient and private and can work offline. This opens up development opportunities in sectors where information security is paramount and in areas where connectivity is limited.





## The application possibilities are limitless

AI-driven AV automation is a trending and largely untapped area that could bring significant value to users. Machine learning presents tremendous opportunities to simplify video production workflows and automate processes. Combined, Pearl hardware capabilities and machine learning functionality can serve as the foundation for a vast number of solutions. These solutions can find applications in education, security, broadcasting, healthcare, and government.

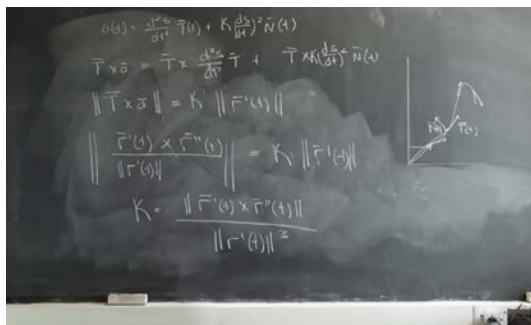
For example, take lecture capture. You can:

- Automate video recording by learning environmental cues (room lighting, audio detection, speaker moving into frame) and use them to initiate recording
- Build an unobstructed virtual classroom experience by identifying and isolating the instructor from the board while the lecture is in session
- Solve the challenge of privacy in live video by adding automated facial blurring

Other applications include automated lower thirds, transcription-based indexing, automatic highlight reels, and abridged videos, to name a few.



**Before Clear Lecture™**



**After Clear Lecture**

*Clear Lecture provides an unobstructed virtual classroom experience.*

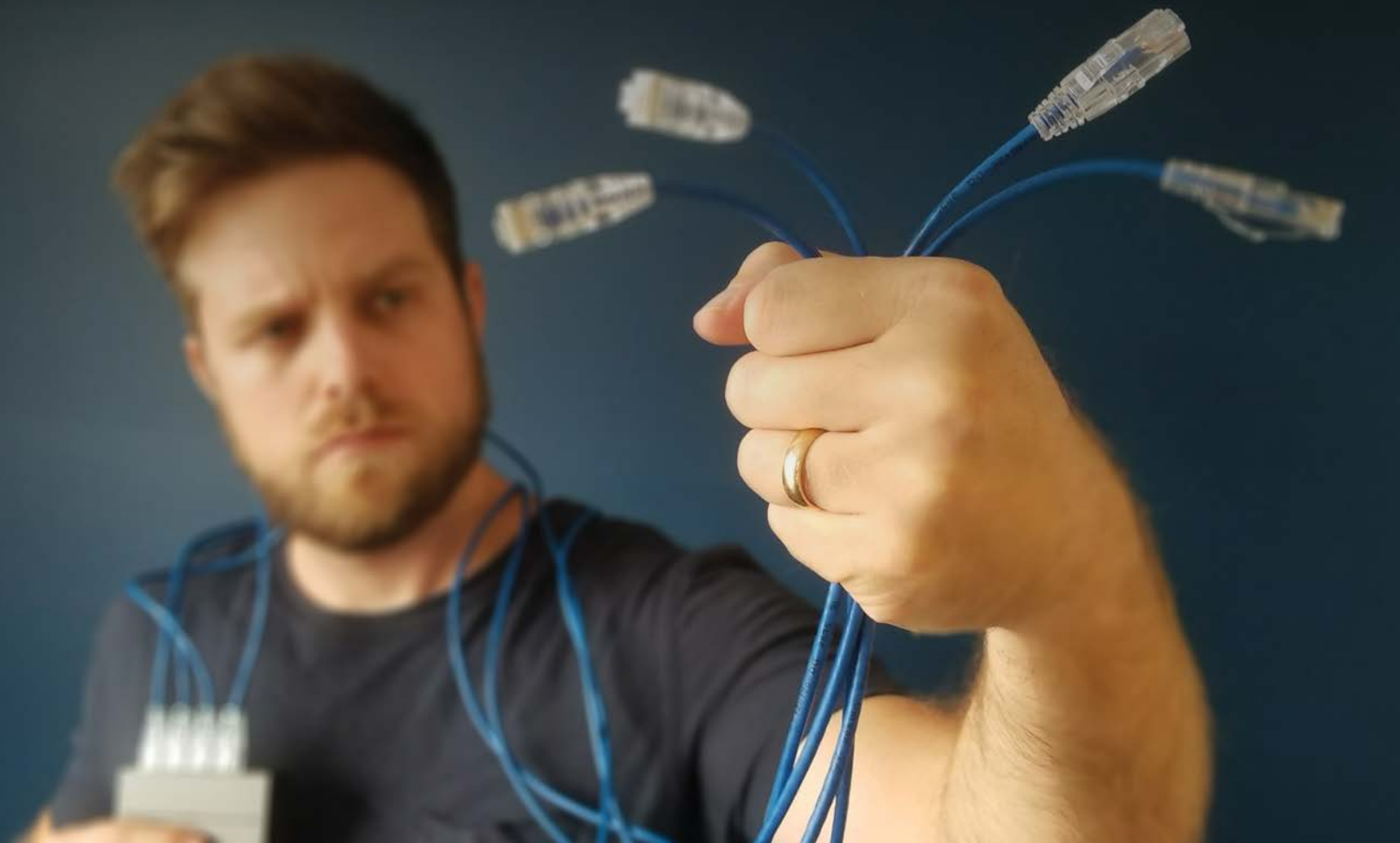
We hope you are as inspired by the possibilities of Pearl-powered machine learning applications as we are. We welcome all interested developers to share ideas and experiment using Pearl hardware. If you have any further questions or would like to discuss potential projects, please reach out to us at [info@epiphany.com](mailto:info@epiphany.com).



# Machine learning opportunities for video production

Download the brochure to learn more.





# Beyond Ethernet: Networking options for live video

The AV space is full of Ethernet diehards. After all, reliability is everything for live video – which means a hardwire to the network or nothing. Right? That’s less true today with advances in mobile and wireless networking technology. And sometimes Ethernet just isn’t an option.

## Calling Pearl customers

Have you ever wished Pearl systems supported additional connectivity options like Wi-Fi, LTE and 5G, or cellular bonding? If so, we want to hear from you!

Email [info@epiphan.com](mailto:info@epiphan.com) to share your use case and help shape the future of Pearl.

## When Ethernet is off the table

Conventional AV wisdom suggests anything but Ethernet will jeopardize your production. To be sure, a direct line to a stable, high-speed network is still top of the pack and the safest bet when circumstances allow. But it's worth thinking about what else is out there to avoid putting constraints on your projects.

Sometimes streaming over Ethernet is problematic or outright impossible. Maybe the venue's network is at capacity during a busy event, or an Ethernet cable running from a router to a distant encoder poses an unacceptable tripping hazard, or you're producing "in the field" content where there's no Ethernet port in sight. Whatever the case, there are other options to consider.

### Go mobile: LTE and 5G

There's been a lot of buzz around 5G in the last few years, and for good reason. 5G promises faster speeds, improved connection reliability, and lower latency than what was possible before. This is thanks to smaller, more densely packed cells, super-high radio frequencies, carrier aggregation, and other cutting-edge developments.

5G isn't widely available yet. Broader rollouts are expected over the next several years, and it'll be awhile before we see multigigabit upload speeds everywhere. In any case, if 5G has landed in your market and you have 5G-capable hardware on hand, it could just make your production.

Today's LTE networks may even be suitable for certain productions, provided you're in an area with good coverage and have the right data plan. Secure Reliable Transport (SRT) makes this more feasible; it continuously sends and receives control data during streaming to minimize packet loss, jitter, and other threats to quality.

That said, reliability is a concern with cell-based connections. You may need to invest in additional gear like a larger antenna, as well as an unlimited, unthrottled data plan. And stream types like SRT rendezvous can be more complex since a lot of cell connections feature double Network Address Translation (NAT), which means what appears to be your public IP address probably isn't.

For greater reliability, consider including bonding with automatic failover as part of your mobile setup.

### Boost reliability: Cellular bonding

For mission-critical operations, cellular bonding is probably the closest you can get to Ethernet-level reliability. The technology combines two or more cellular carrier signals, equaling more bandwidth and a stronger signal. Cellular bonding solutions can switch between signals if one becomes unstable or drops entirely. Some can even bring Ethernet or Wi-Fi signals into the mix.

The downside is cost. Not only will you need capable hardware but also an appropriate data plan for each network you want to bond. Still, cellular bonding is a great option if the budget is there.

## Challenge convention: Wi-Fi

By far the most maligned alternative to Ethernet is Wi-Fi. Yet it's hard to ignore just how convenient Wi-Fi is. And if you go beyond your standard Wi-Fi router, it's possible to hit speeds and a level of stability suitable for live video.

Powerline adapters, Wi-Fi extenders, and mesh systems can relay traffic from distant routers for consistent performance across a much wider area than a standalone Wi-Fi router will get you. It may take some research and trial and error to get your network conditions just right, but the resultant bandwidth boost can make all the difference for live video – especially if you pair an optimized Wi-Fi network with a streaming protocol like SRT.

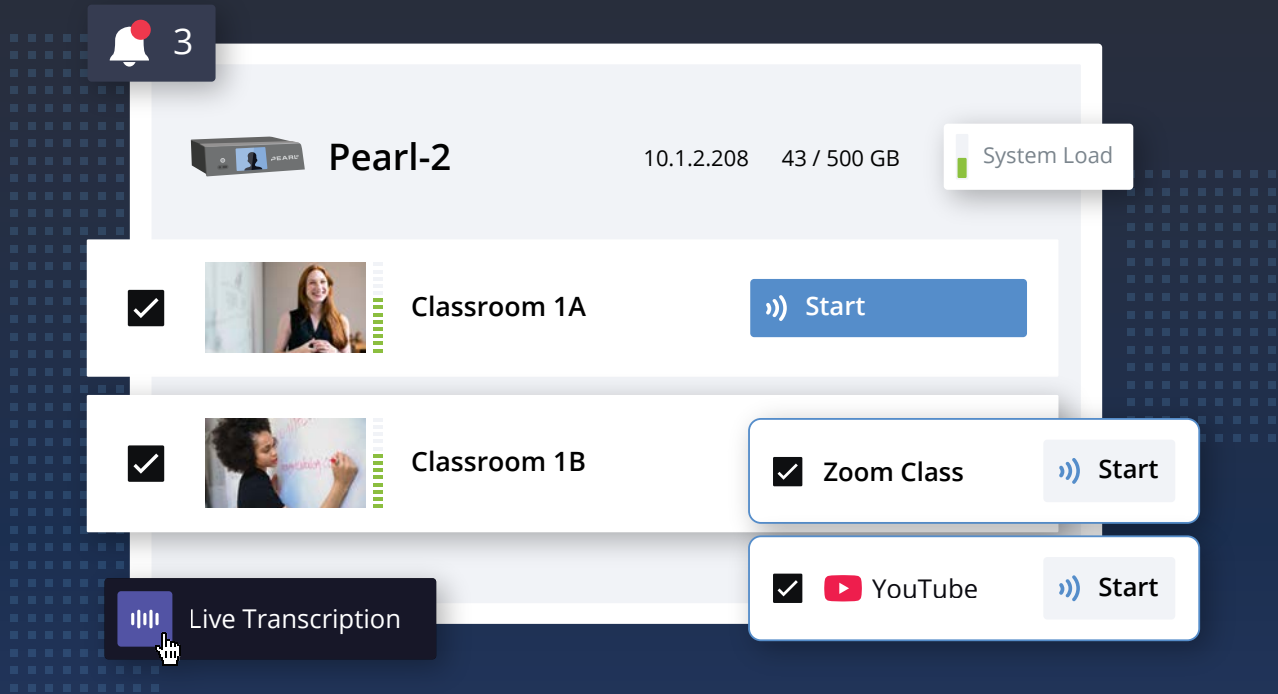


## Have your say: Pearl Wi-Fi, cellular bonding, 5G, and LTE support

Epiphan Pearl hardware encoders are designed for the tried-and-true Ethernet connectivity many customers' AV applications demand. But flexibility is one of our core design philosophies. And as we've outlined here, we know there are occasions when alternative networking options would be appreciated.

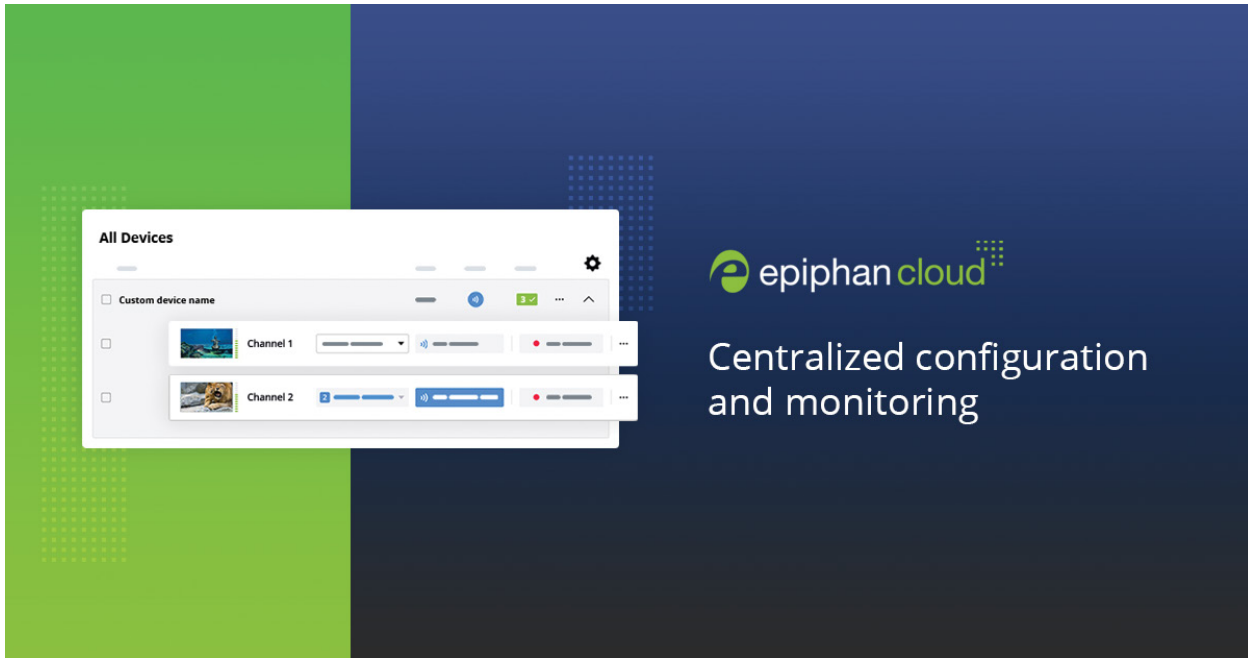
So tell us: Would you like to see Wi-Fi, cellular bonding, 5G, and LTE support on Pearl hardware? What specific applications would you use these features for?

Email [info@epiphan.com](mailto:info@epiphan.com) with your thoughts and help shape the future of Pearl.



# A new way to manage your Epiphany devices

Live video production can take up a lot of time, so efficiency is everything. Enter Epiphany Cloud, a centralized platform for all your Epiphany devices. Whether you use Pearl-2, Pearl Mini, or Pearl Nano hardware encoders for streaming and recording or LiveScript for automatic transcription, you can benefit from Epiphany Cloud.



epiphan cloud

Centralized configuration and monitoring

## What is Epiphan Cloud?

Think of Epiphan Cloud as your command center for everything Epiphan. It's where you can go to get a birds-eye view of Epiphan hardware you own with access to essential device statistics and a host of remote control and configuration features that'll save you tons of time.

This is something Epiphan customers have been asking for, and it's here. What can you expect from Epiphan Cloud? Let's go over some of the biggest features.

### 1 Assess your devices at a glance

Epiphan Cloud takes the legwork out of multi-device management with a sleek and comprehensive dashboard that displays key information about all your registered devices. You can see at a glance:

- **Operational status:** With a Pearl hardware encoder, quickly determine whether it's idle, streaming, recording, or streaming and recording simultaneously. For LiveScrypt, easily tell if the system is transcribing or standing by.
- **Device info:** Serial numbers, IP addresses, and installed firmware version are easy to confirm with Epiphan Cloud.

- **System health:** Stats like system load, temperature, and uptime offer insight into the condition of a device.
- **Available storage:** With easy confirmation of how much storage space is left on a device, you can ensure you've transferred all the files you need and make room for another recording before your next event starts. Epiphan Cloud also shows activity in automatic file upload queues – how many files are being uploaded, their combined size, and how much longer a transfer will take.

If any of these statistics are more important to you than others, Epiphan Cloud's customizable UI has you covered. The drag-and-drop interface makes it easy to rearrange elements to put your most essential stats front and center.

## 2 Control and collaborate in the cloud

Epiphan Cloud also offers you control over Epiphan hardware. Here are a few of the options for each type of device.

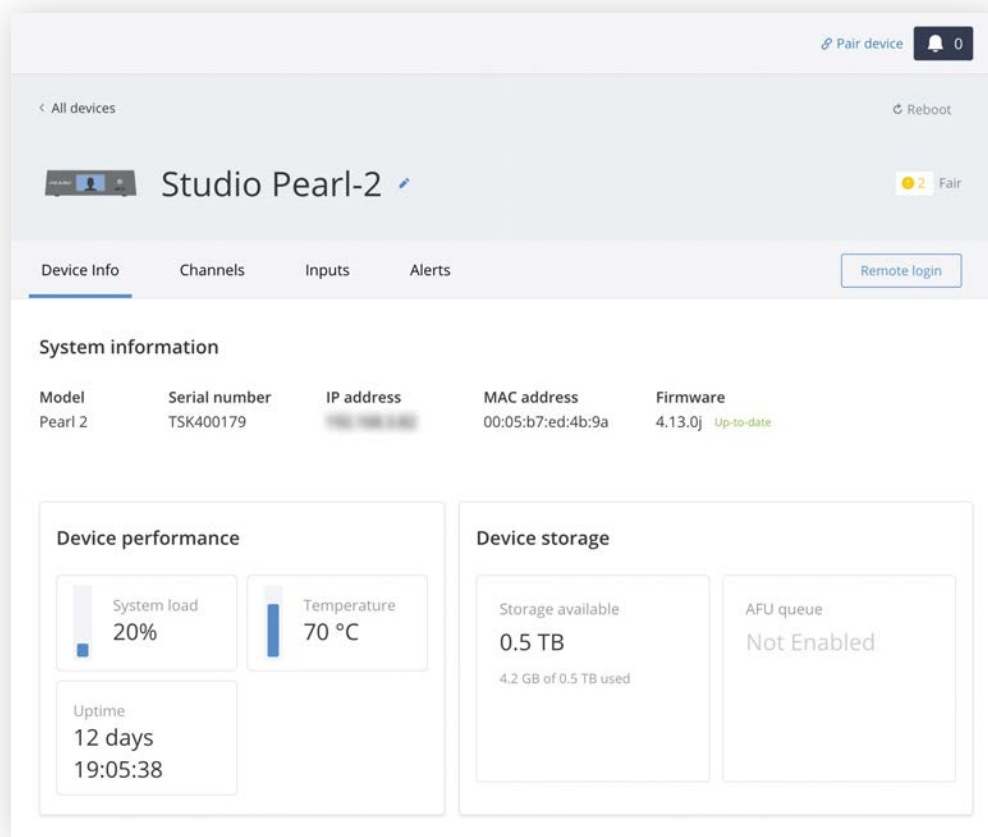
### Pearl systems

- Start and stop recording and/or streaming channels
- Create a streaming destination, including custom RTMP streams
- Monitor connected audio and video sources

### LiveScript

- Configure transcription settings, including output display
- Start, stop, and pause transcribing
- Download and delete .txt and .srt files
- See transcriptions and audio meter in real time for confidence monitoring and audio optimization

You may still want to dive into Pearl's web-based UI for more precise control, but having key encoding settings and input and channel previews all in one place can be a huge timesaver.



Of course, managing a fleet of devices is a team effort. That's why we built Epiphan Cloud with collaboration in mind. Anyone on your team who's part of your shared Epiphan Cloud account will be able to monitor or interact with a registered Pearl or LiveScript system from any location.

### 3 Save time with batch actions

Epiphan firmware updates come packed with performance enhancements and even brand-new features like Kaltura/Panopto integration and SRT support. Naturally, you'll want the benefits of the latest updates across all your systems. But it can take awhile to make that happen when you have dozens or even hundreds of devices. With just a few clicks in Epiphan Cloud, you can download and install the latest upgrades to your Epiphan solutions simultaneously. That'll save some IT time.

That's not the only batch action Epiphan Cloud offers. You can also:

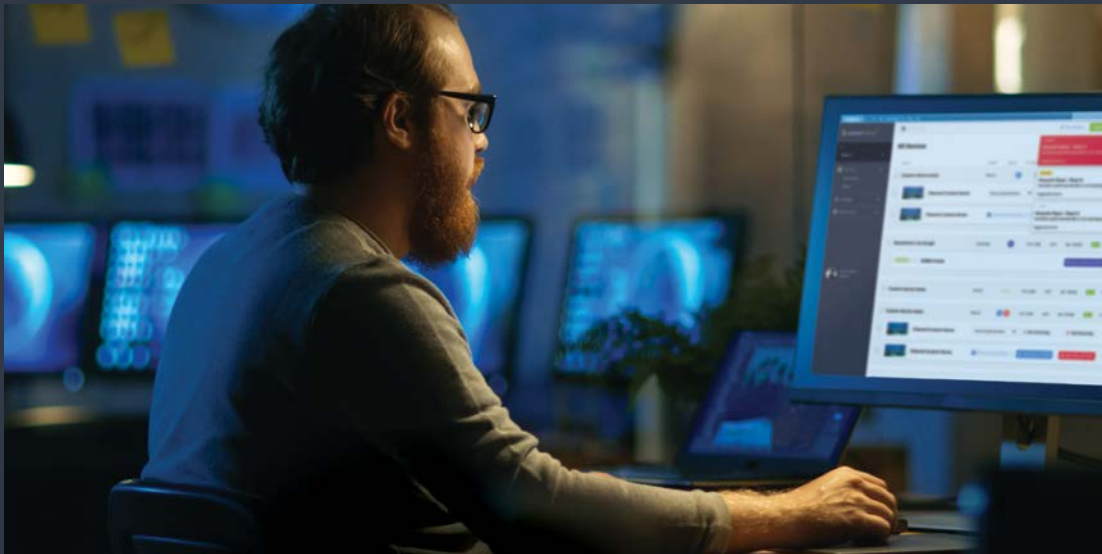
- Start or stop streaming and recording on multiple devices
- Reboot multiple systems
- Apply predefined streaming destinations to any registered device

### 4 Resolve production issues quickly

It's a fact of technology: errors happen. A fast resolution is the best response. That takes awareness, and you can't have eyes on everything at once or all the time.

But Epiphan Cloud is always watching. A refined alerting system will notify you of any issues so you can act quickly. The platform doesn't just sound the alarm; it also dispenses enough information to help you determine what the problem is, and even provides a list of probable solutions to support swift action.

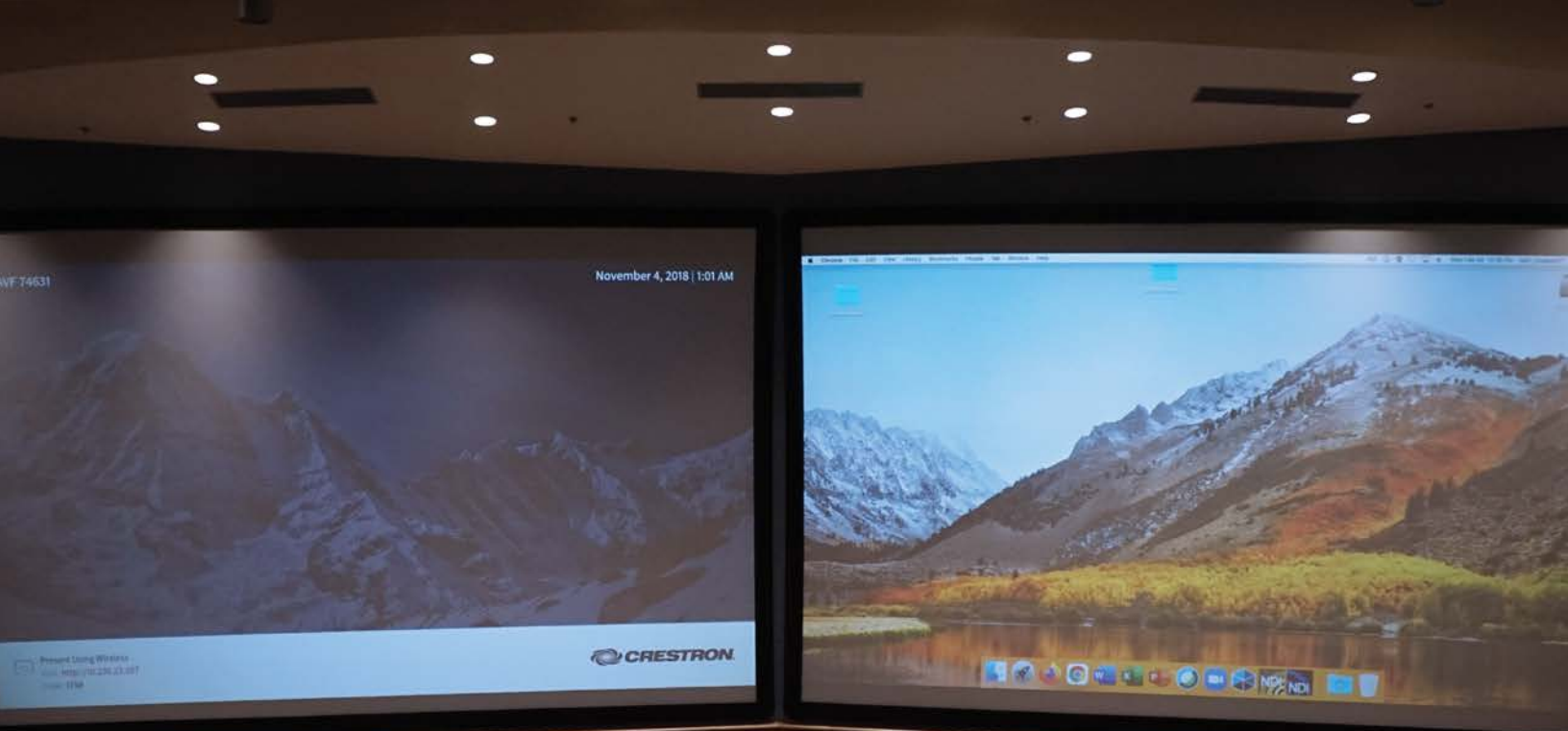
You can fine-tune this system to alert you only to particular events, such as a change in device status from online to off, a lack of available storage, or a drop in uplink bandwidth. In any event, Epiphan Cloud logs every error. This way you can investigate issues and take action to prevent repeat occurrences.



## Manage your Epiphan hardware in the cloud

Want to learn more about how Epiphan solutions and Epiphan Cloud work together? Visit [epiphan.com/cloud](https://epiphan.com/cloud) or email [info@epiphan.com](mailto:info@epiphan.com) to schedule a one-on-one demo.





# Pearl underpins remote and hybrid learning at the University of Rhode Island

The University of Rhode Island AV team equipped 30 classrooms with Pearl-2 and Pearl Mini hardware encoders for flexible, user-friendly lecture capture and streaming.

## Pressed for a streaming solution for hybrid learning

In early 2020, the University of Rhode Island (URI) wanted to deploy a campus-wide live streaming solution that was simple for faculty to use. The devices the university had on hand were too complex, requiring that the AV team bring in a specialist every time they needed to live stream.

With the pandemic, URI suddenly needed to enable remote and hybrid learning in every classroom, active learning room, and auditorium – fast. The solution had to be flexible enough to stream out to students at home and stream into the room when a faculty member had to teach from home.

Different spaces called for different solutions. For classrooms with basic streaming configurations (e.g., a talking head and slides), the solution was to use video capture computer software. But media-rich learning spaces like active learning classrooms and auditoriums required a more complex and robust solution like a hardware streaming encoder.

The AV team was looking at hardware solutions with deep Crestron technology integration because Crestron is the backbone of the university's AV infrastructure. Two other factors were ease of use and size. Faculty had to be able to use the solution no matter their level of technical expertise. Additionally, the device couldn't take up too much precious space on the lectern.



## A short and easy search

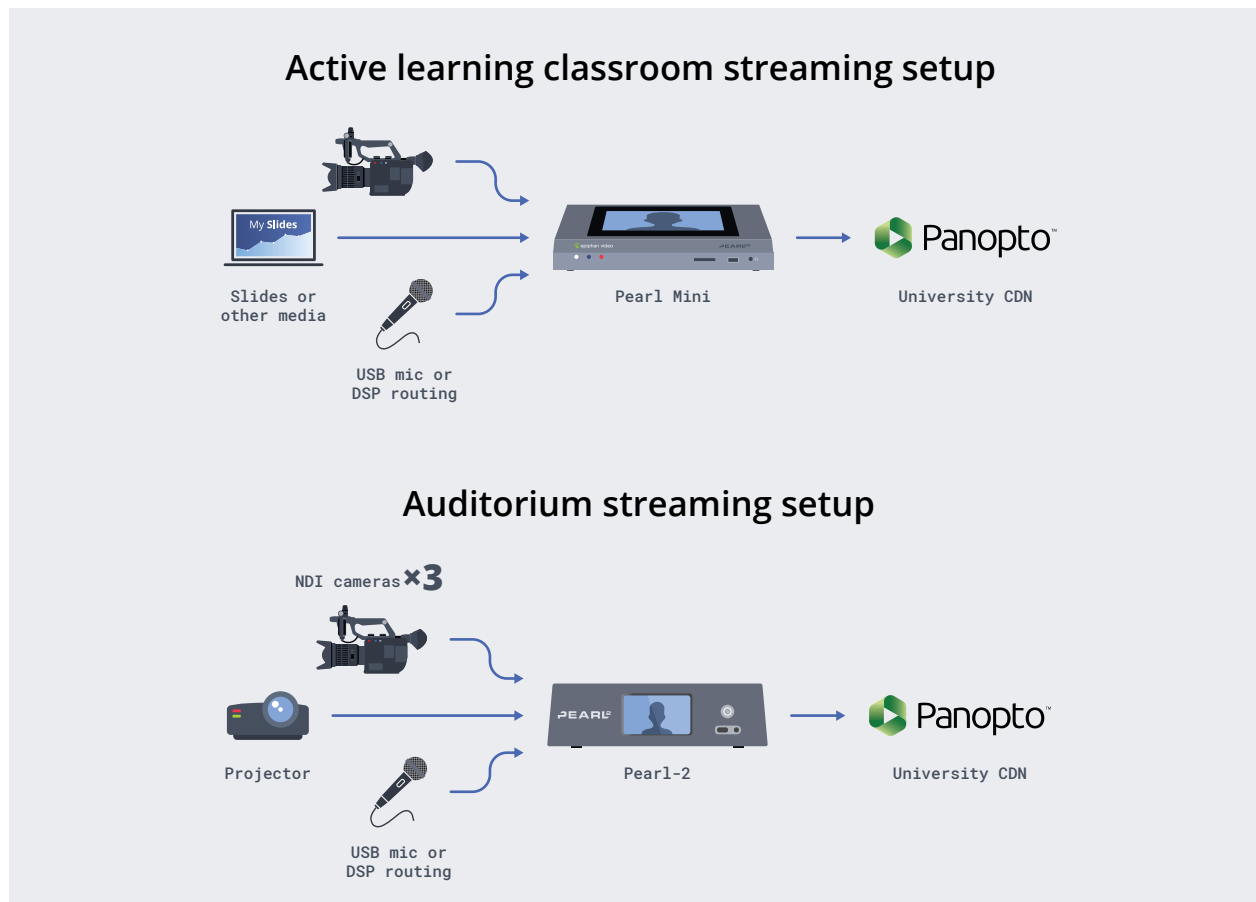
URI Senior Information Technologist Jeffrey Levesque first encountered Epiphan Pearl-2 and Pearl Mini lecture capture systems at a Crestron Masters training event. Both devices offered not only deep Crestron integration options but also a rich set of features. Levesque noted Pearl-2 as a powerful video production encoder and Pearl Mini as a compact, user-friendly device with a large touch screen for easy video monitoring. When it came time to make a decision, he reviewed the options and the choice was clear.

*"No other solution really fit as well. It was a no-brainer for us."*

**Jeffrey Levesque**  
Senior Information Technologist at URI

URI outfitted 30 active learning classrooms with Pearl Minis, capturing speaker video from a camera and a computer source. Audio was routed in one of two ways: directly into Pearl using XLR audio or USB, or through the classroom's Digital Signal Processing (DSP) system. The AV team also installed Pearl-2s in three large auditoriums, where inputs included three NDI cameras and a projector source.

For URI, the choice of hardware informed the choice of the video content management system (CMS). Pearl's direct integrations with Panopto and Kaltura narrowed the search to these two options. Ultimately, URI chose Panopto and was able to take advantage of the powerful scheduling integration on Pearl. After a lecture wraps up, all content gets uploaded to Panopto and distributed to Brightspace, the school's learning management system (LMS), where it's ready for student access.





## A solution appreciated campus-wide

Around campus, Pearls are revered as reliable and easy-to-use devices. The main benefits to the university include:

### Ease of use for faculty

Pearl Mini's large touch screen makes faculty members feel more confident about lecture streaming and recording. They find Pearl's user interface intuitive and easy to navigate. Faculty also find the Panopto scheduling system easy to operate on Pearl, allowing them to start and stop lecture capture at the touch of a button. Knowing they can "set it and forget it" frees them up to focus on teaching and not waste time fumbling around with technology.

Faculty members use various layout presets the school videographer built using Pearl's powerful and simplified custom layouts builder. This way, faculty don't have to spend time figuring out optimal source arrangements and feel more comfortable with switching.

### Ease of installation, operation, and maintenance

The URI AV team was able to easily install and configure all Pearl systems on their own. Pearl fit well into their existing Crestron infrastructure and integrated seamlessly with Panopto. With the Panopto scheduling integration, the team can set up all lecture capture at the beginning of the semester, and from there the process is fully automated.

---

*"Products and solutions like Pearl-2 and Pearl Mini that offer strong backbones and strong oversight options are what really help us, as a relatively small group on campus, be as effective as we can."*

**Katie Babula**  
Manager ITS AV Systems at URI

Pearl's remote accessibility is an essential feature for the AV team. With the ability to log into systems from anywhere, tasks like monitoring events, adjusting audio gain, and troubleshooting are a breeze.

URI is on track to connect all Pearl devices to Epiphany Cloud to centralize device management. This will provide an easy way to monitor all Pearl devices in one location and make remote operation even easier.

## Safety and security

The IT and AV teams at URI were impressed with Pearl's ability to work natively with the university's robust IT structure. The AV team also takes advantage of the Kensington lock slot on the back of each device to limit physical access to the device.

URI has plans to expand its AV setup to include more classrooms in new buildings. When the question came up of what streaming solution should go in those classrooms, the AV team had the answer ready:

---

*"When they asked about lecture capture and recording we'd pointed them to the Pearls. Even before our project went live, we were recommending them as the preferred unit for us to go forward with."*

**Jeffrey Levesque**

Senior Information Technologist at URI

Thanks to Pearl, URI is able to provide varying degrees of flexibility for in-person attendance to students. The university can now offer classes as in-person with recording backup, fully hybrid, or streamed only. Pearl lecture capture systems offer a flexible video capture and streaming solution that will provide benefits far beyond URI's current remote learning needs.

## About the University of Rhode Island

The University of Rhode Island is the State's public land-grant research university. URI is a diverse and dynamic community whose members are connected by a common quest for knowledge. As a major research university defined by innovation and big thinking, URI offers its undergraduate, graduate, and professional students distinctive educational opportunities designed to meet the global challenges of today's world and the rapidly evolving needs of tomorrow.





# Pearl system buyer's guide: Choosing the best fit for your AV ambitions

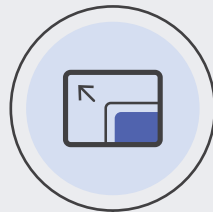
There's Pearl-2, Pearl Mini, and now the new Pearl Nano. So which Pearl hardware encoder best meets your live streaming and recording needs?

# 4 QUESTIONS FOR YOUR VIDEO PRODUCTION

## ONE

### INPUTS

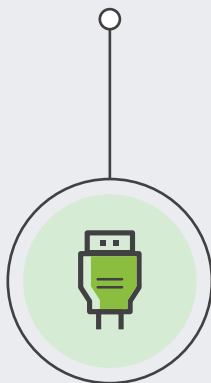
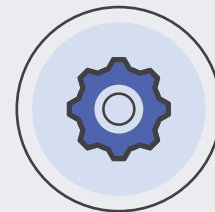
How many inputs do you need, and what are your sources (e.g., three cameras and one laptop, one camera and one laptop)?



## THREE

### OUTPUTS

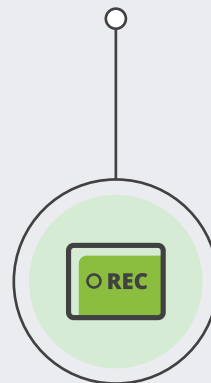
How many separate encoded outputs do you need (e.g., ISO recordings, or a program mix)?



## TWO

### RESOLUTION

Do you have any 4K sources, or only HD?



## FOUR

### ADVANCED FEATURES

Do your production plans require NDI, chroma keying?

## ...AND FINALLY

Once you're clear on these, it's just a matter of matching your needs to the Pearl system (or systems) that can support them.

## Meet the Pearl family

All Pearl systems are versatile, reliable, easy to use, and professional quality. Where they differ is in their features and the kinds of applications they're best for.



### Pearl Nano: The perfect-fit streamer and recorder

Pearl Nano offers the ultimate blend of portability and versatility with a refined yet robust feature set that includes ingestion, encoding, HDMI pass-through, and recording. Nano is a perfect fit for video distribution, SRT contribution encoding, and production for smaller-scale live events.

For a more in-depth look at this newest member of the Pearl family, see our Pearl Nano primer on page 17.

#### Key features

- Full HD video recorder, streamer, splitter, and scaler
- Two video inputs + networked inputs
- 2.2 inch front screen for confidence monitoring + buttons for control
- Two XLR line-level audio inputs
- SD card slot or M.2 SATA SSD expansion bay for storage
- HDMI pass-through for zero-latency content display
- PoE+ and DC power

#### Ideal for

- Smaller-scale live event production
- SRT contribution
- Streamer and recorder add-on to a full production switcher





## Pearl Mini: Simplified live video production

Pearl Mini offers the same switching, recording, streaming, splitting, and scaling capabilities as Pearl-2 in a more portable chassis. You can directly connect up to three video sources, and the two combined XLR/TRS jacks support phantom power for XLR. Pearl Mini also features a giant touch screen for maximum ease of use.

### Key features

- Full HD video switcher, recorder, streamer, splitter, and scaler
- Three video inputs + networked inputs
- 7 inch touch screen for confidence monitoring and control
- Two XLR/TRS mic-level audio inputs with phantom power for XLR
- SD card slot for storage

### Ideal for

- Productions that involve multiple sources and layouts, switching, etc.
- Shared video production environments where ease of use is paramount

### Key features

- 4K video switcher, recorder, streamer, splitter, and scaler
- Six video inputs + networked inputs
- 4 inch touch screen for confidence monitoring and control
- Four XLR line-level audio inputs
- 500 GB internal hard drive
- NDI support
- Chroma keying

### Ideal for

- All-in-one video production studios
- Larger-scale video productions – 4K, multiple cameras, etc.
- Production hub for SRT contributions
- Redundancy (Rackmount Twin model)



## Pearl-2: The ultimate all-in-one video production system

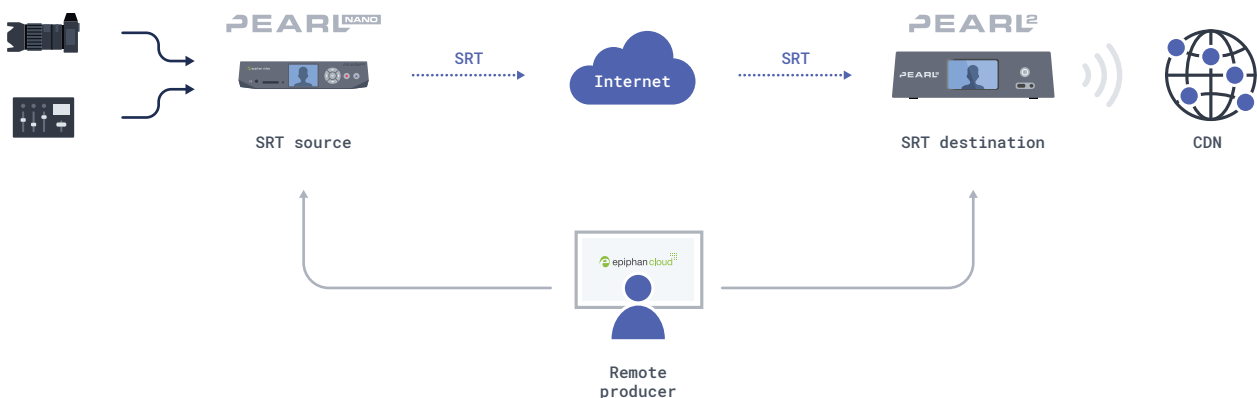
Pearl-2 is a video switcher, recorder, streamer, splitter, and scaler all in one. With six video inputs and four for XLR professional audio, 4K streaming and recording, NDI support, chroma keying, and much more, Pearl-2 brings the pro features and processing horsepower required for the most demanding live events.

## Device management made easy

Some applications demand multiple systems – live productions with remote guests, for instance. Or maybe you need video production equipment in multiple locations, such as a hardware encoder in every classroom for lecture capture. Whatever the case, Epiphan Cloud makes managing multiple Pearl systems a breeze by centralizing configuration and monitoring of paired systems.

Epiphan Cloud also enables end-to-end control, making it possible for producers to access and configure Pearl systems remotely. This is ideal for an application like SRT contribution, with the all-in-one Pearl-2 as the production encoder and Pearl Nano – compact, lightweight, and cost-effective to ship out – as the SRT contribution encoder.

Not yet acquainted with Epiphan Cloud? Get primed with our overview on page 27.



A photograph showing three pieces of Epiphan Pearl hardware against a dark background. In the foreground, a Pearl Nano device is shown with a screen displaying a video of two people. Behind it is a larger Pearl 2 device, also with a screen showing a video. To the right is another Pearl Nano device with a different screen display. All devices have the Epiphan logo and 'PEARL' branding.

### Get the full Pearl family breakdown

Looking for a more in-depth comparison of Pearl system specs? You can find it at [epiphan.com/products/compare-pearl-systems](https://www.epiphan.com/products/compare-pearl-systems), and an even deeper dive on each system's dedicated product page. As always, you can also reach out to [info@epiphan.com](mailto:info@epiphan.com) with questions or to arrange a one-on-one demo.



**Epiphan Pearl Nano™**

Use as a powerful and reliable video distribution device or contribution encoder, or leverage the device's streaming and recording functions.



1920 × 1200 - 60 fps



**Epiphan Pearl Mini™**

Simplify your lecture capture or live event production. Record, stream, and switch multiple HD inputs simultaneously.



1920 × 1200 - 60 fps



**Epiphan Pearl-2™**

Powerful, all-in-one live production system with 4K HDMI, 12G SDI, NDI, and the capacity for six simultaneous 1080p channels.



4096 × 2160 - 30 fps



**Epiphan Pearl-2™ Rackmount**

All the same features as Pearl-2 but designed for installation in a rack.



**Epiphan Pearl-2™ Rackmount Twin**

Two completely independent Pearl-2 systems for a high-density rack installation.



**Epiphan AV.io 4K™**

Capture 4K over HDMI in perfect fidelity or use hardware scaling to capture any resolution needed for your application.



4096 × 2160 - 30 fps  
1920 × 1080 - 60 fps



**Epiphan AV.io HD™**

The simplest way to capture HDMI, VGA, or DVI video sources at resolutions up to 1080p.



1920 × 1080 - 60 fps



**Epiphan AV.io SDI™**

Works seamlessly with your SDI video sources, including SD-SDI, HD-SDI, and 3G-SDI.



1920 × 1080 - 60 fps



**Epiphan DVI2USB 3.0™**

Get precision video capture control over color space, cropping, resolution, and scaling for any device with HDMI, DVI, or VGA output ports.



1920 × 1200 - 60 fps



**Epiphan SDI2USB 3.0™**

Rugged and portable video grabber for AV professionals looking to capture 3G-SDI, HD-SDI, and SD-SDI signals.



1920 × 1080 - 60 fps



**Epiphan DVI2PCIe Duo™**

Internal PCIe capture card captures lossless video from dual-link and single-link DVI video sources, as well as VGA, HDMI, and SDI video sources with audio from SDI and HDMI sources.



2560 × 1600 - 85 fps  
2048 × 2048 - 85 fps



**Epiphan KVM2USB 3.0™**

Manage local servers and headless computers using KVM over USB 3.0 with HDMI, DVI, or VGA connectors.



1920 × 1200 - 60 fps



**Epiphan VGADVI Broadcaster™**

Capture, combine, and stream audio plus full HD and SD video. A quiet and portable video recorder for DVI, HDMI, VGA, DisplayPort, S-Video, and composite sources.

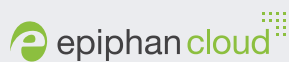


1920 × 1200 - 30 fps



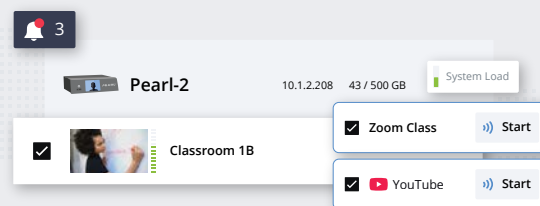
**Epiphan LiveScrypt™**

Real-time automatic transcription with built-in professional audio inputs, making it easier to achieve accurate AI-based transcription.



**Epiphan Cloud™**

Your command center for everything Epiphan





# INSIDE EPIPHAN



## A message from the pets behind the people behind the products

Staying at home has been challenging. One thing that's been helping us compensate for all the lost human contact is our pets. Our "Pet Friday" photo-sharing initiative was an instant hit. This page and the previous show just a few of the four-legged companions who've provided emotional support to Epiphan team members all through last year.



# In the spotlight

## Yusupha Touray

### Product manager and pro problem solver

Pearl-2, Pearl Mini, or Epiphan Cloud not meeting your needs? Yusupha Touray wants to hear it.

“When a customer comes to me with a problem, I see it as a good thing,” he says. “It means they want our product to be better. Even if they don’t choose our stuff in the end, their feedback is a valuable opportunity to improve.”

That customer focus runs through Yusupha’s work as manager of Epiphan’s Pearl-2 and Pearl Mini video production systems and now Epiphan Cloud. As keeper of the roadmaps for these products, Yusupha works closely with customers and distributors to understand the real impacts of proposed features – all while keeping a tireless eye on the competitive market and emerging industry standards.

Yusupha joined Epiphan as an applications engineer, bringing deep technical expertise and a customer-centric mindset from a software development role that often saw him face-to-face with customers to demo solutions and assess their needs. As product manager, Yusupha helps connect customer requirements to development priorities, leveraging his business sense and first-hand knowledge of R&D realities and timelines.

It’s a tall order to manage such versatile and impactful products as Epiphan’s flagship Pearl-2 hardware encoder. But seeing the results of a new feature or fix makes it all worth it, Yusupha says. “When I help solve a problem and see a bunch of happy customers, that’s the best week.”

When he’s not working with Epiphan products, partners, or customers, Yusupha is helping raise his two daughters.



---

*“When a customer comes to me with a problem, I see it as a good thing. It means they want our product to be better. Even if they don’t choose our stuff in the end, their feedback is a valuable opportunity to improve.”*

**Yusupha Touray**  
Product manager





**LIVE**

TWICE MONTHLY ON  
**THURSDAY**  
3PM ET



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for pro AV**

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Email [info@epiphan.com](mailto:info@epiphan.com)

Toll free +1 (877) 599-6581

North America +1 (650) 644-4684

United Kingdom +44 (0)20 3744 8277

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# PEARL NANO

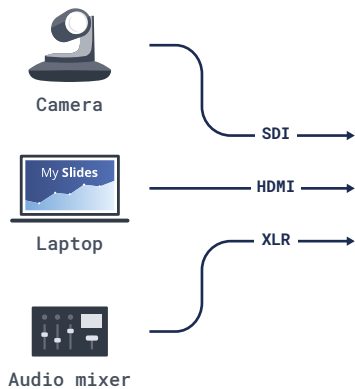


## EPIPHAN PEARL NANO™

# The perfect-fit streamer and recorder

Pearl Nano offers the ultimate blend of portability and versatility with a refined yet robust feature set that includes ingestion, encoding, HDMI pass-through, and recording.

### CONNECT YOUR SOURCES



## PEARL NANO



REC Record to SD card or SSD

### OUTPUT YOUR VIDEO

