FALL 2021

EVOLUTION

By Epiphan Video

UNLOCK THE POWER OF

REMOTE PRODUCTION

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Photo by Liam Olders

Broadcast without barriers

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

Looking ahead to what's next for video technology, we see an exciting new reality. It is a world of boundless communication – one where location and technical background cease to matter when it comes to getting your message out. It is a world rich with opportunity for a new generation of content creators, enabled by accessible technology that makes it possible to broadcast without barriers.

The architecture of this new world will be streaming technology. The foundation for this is already set. This past summer we witnessed the realization of the 2020 Tokyo Olympic Games, a tremendous feat of not just athletics but also of live video production and streaming. Of particular note for our industry: the event saw a 279 percent increase in streaming viewing time over 2018, making it the most streamed Olympics of all time.

Epiphan's place in this world is easy to discern: to empower content creators and organizations with innovative, intuitive, and reliable tools for producing broadcast-quality video. In many ways, it is a role we have filled from the start. We have always designed our products for ease of use, beginning with our innovative capture cards and continuing with our intuitive Pearl and LiveScrypt systems. We have also always built our solutions for long-term reliability, earning us the trust of customers across a broad sweep of sectors – and even aboard the International Space Station.

We will continue to work to ensure our products are accessible, dependable, and evolve with your needs. For evidence of this evolution, look no further than our regular firmware updates, which bring performance improvements and enhanced capabilities. Additionally, we develop and offer upgrades that allow you to do more with your existing Epiphan hardware, such as the 4K and H.265/HEVC add-on for Pearl Nano (detailed on).

Now is the time to ready yourself for this new world and all the opportunities that await within it. Should you find yourself without the tools you need to broadcast without barriers, please feel free to reach out to us or the broader team – we are here to help and always happy to talk technology.

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Video production in the cloud: An Epiphan experiment

Some tasks translate seamlessly to a remote work environment. Video production isn't one of them. That's the challenge we faced over a year ago trying to produce webinars, a live show, and on-demand video content with everyone out of the office.

Epiphan Cloud live demo: Multi-device management made easy
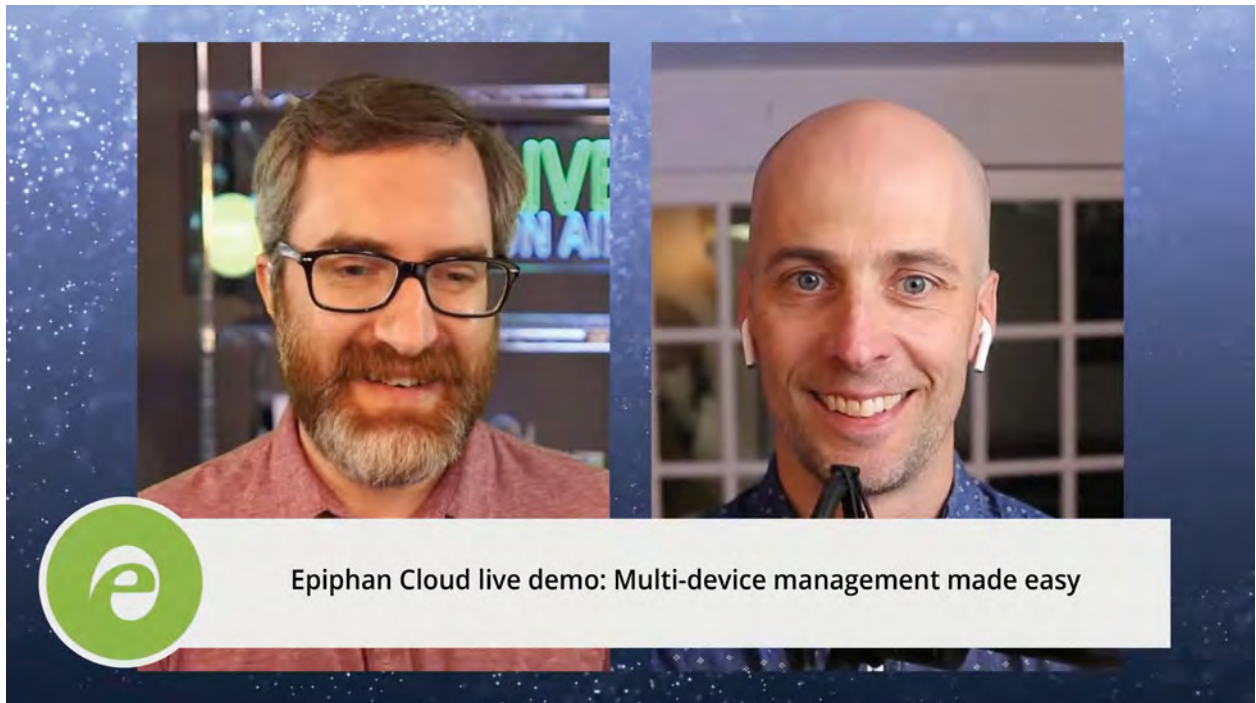
Luckily for us, Pearl hardware encoders are remotely accessible and support the Secure Reliable Transport (SRT) protocol, which enables high-quality, low-latency streaming over any network. These capabilities gave us a perfectly serviceable workflow. But it got us thinking: How much could we improve our processes if we migrated our live production to the cloud? So we tried it. Here's how that went.

The push to produce in the cloud

Most residential Internet connections can't compare to a corporate-grade network. There are exceptions, of course. But sometimes the bandwidth gap is impossible to bridge, such as when a producer or contributor lives in a rural area that lacks the infrastructure for smooth streaming.

The wide range of home network setups is one of the biggest challenges of producing video remotely, especially when multiple participants are involved. While SRT makes the concept of live streaming from anywhere palpable, it does little to solve the problem of a live producer with a dodgy Internet connection.

With Pearl's remote access capabilities, we were able to remotely log in to and control Pearl systems set up in our corporate offices. This allowed our producer to work with a production encoder that's connected to a robust network. Great for us, but what if we *didn't* have access to a facility equipped with a high-end network?

It's a fair question. We thought we might have an answer – and put it to the test.
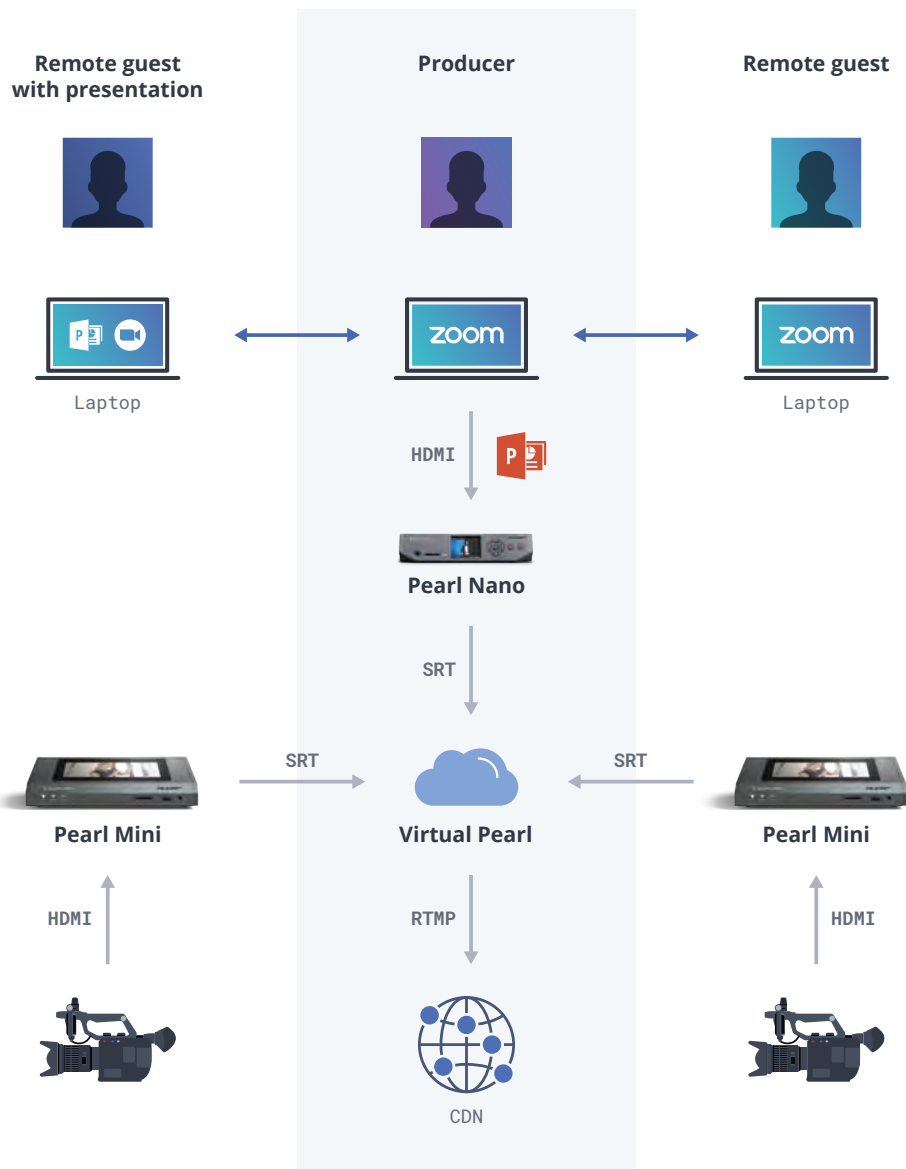
Virtualizing our live production

To further refine our webinar and live show workflows, we set our sights on migrating key production tasks to the cloud. We developed a prototype tool – called "Virtual Pearl" – that can send and receive SRT and Network Device Interface (NDI®) sources while leveraging Pearl's layout editor, live switching, and other production capabilities.

SRT was essential here. Offering unparalleled control over real-time video and audio transmission, SRT helps ensure the best quality possible on any given network. This made it the perfect protocol for bringing in contributor feeds from remote guests, whether they were using an SRT-capable software encoder like OBS, a mobile phone app like Rivet, or a Pearl system set up in their home. We used NDI for live titling through NewBlue's Titler Live 4 software, though we could have eliminated this step with a cloud-based titling solution like Singular.live.

Almost immediately, the potential for live video production in the cloud was clear.

What we learned

Video production in the cloud offers some compelling advantages over hardware-based workflows for projects that involve a remote producer and multiple, far-flung participants.

Advantages of cloud production

Accessibility: With no need to remotely connect to powered-on hardware, a cloud-based production solution offers on-demand access anywhere there's an Internet connection, and from any device with a web browser.

Scalability: Hardware solutions have hard limits. Whereas a cloud solution can scale to accommodate as many inputs and outputs as you need – all with zero bandwidth restrictions.

Affordability: The cost benefits of the cloud go hand in hand with scalability. Because our cloud provider only billed us for the resources we used, the costs of producing our content in the cloud were minimal.

Redundancy: Cloud-based production means never needing someone to be on site or travel there to physically work with the hardware.

Reflecting on our foray into cloud-powered production

In some ways, the advantages we observed weren't surprising. Nearly every cloud solution delivers accessibility, scalability, affordability, and redundancy. It's why companies have migrated so many documents, media, and software to the cloud and continue to.

What's exciting is that it's possible to channel the power of the cloud for live video production – today. While hardware will always have its place in video production, cloud-based solutions will become indispensable tools as hybrid work models change everything.
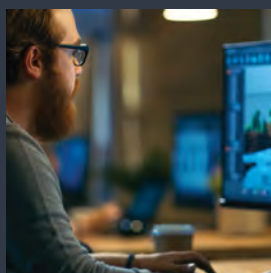
Sound off: Video production in the cloud

Find the concept compelling? See no need for it?
Either way, we'd love to hear your thoughts on cloud-based video production. Send them to magazine@epiphan.com.

AV-over-IP showdown: SRT vs. NDI for remote video production

Secure Reliable Transport (SRT) and Network Device Interface (NDI) have a lot in common. Both are free AV-over-IP solutions that offer high-quality, low-latency video transport. That said, they do serve different applications. So when should you use one over the other? Let's take a closer look.

What is SRT?

SRT is an open-source video transport protocol that enables high-quality, low-latency video delivery across the public Internet. It allows control over latency to adjust for changing conditions on any given network. Built into SRT is a two-way backchannel that carries essential performance information during streaming. This allows the protocol to detect and address issues like packet loss, jitter, and other threats to quality. In addition, this protocol uses different handshaking methods and flexible network address translation (NAT) traversal, making SRT firewall-friendly and secure.

Requirements for SRT streaming

To send and receive an SRT stream, you'll need an SRT-compatible encoder and decoder. This could be an app, software, or hardware appliance like Pearl. To work properly, either the sender or the receiver needs a fixed IP address.

SRT technology is responsible for the transport of data, not video encoding. It's codec-agnostic, which means it relies on other codecs for efficient video compression. That's why SRT streaming requires modest bandwidth: 2–8 Mbps is generally sufficient to stream in high quality.

When to use SRT

SRT streaming is an excellent solution for remote video contribution over the public Internet. For example, you can conduct remote interviews or bring on remote guests for a virtual event via SRT. Your guest would need an SRT-capable encoder and a camera and microphone. This could be as simple as using an SRT contribution app on their phone or a more sophisticated setup, such as an SRT hardware encoder like Pearl Nano, Pearl Mini, or Pearl-2.

SRT benefits

- Delivers low-latency, high-quality video and audio reliably across the Internet, allowing easy and cost-effective contribution from even the most remote places

- Easily traverses firewalls between the SRT source (encoder) and the SRT destination (decoder), minimizing the need to engage a network administrator

- Allows control over latency, making it easier to achieve sub-second latency for applications that require it

- Offers robust security – up to 256-bit Advanced Encryption Standard (AES) encryption – preventing unwanted data access from contribution to distribution
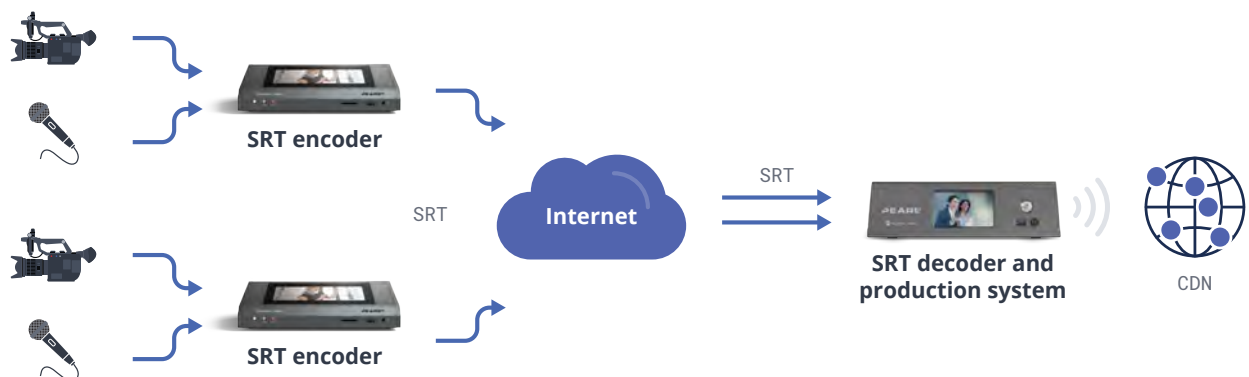
What is NDI?

NDI is a software standard that allows you to transmit and receive broadcast-quality video with low latency over a local area network (LAN). NDI gives you the flexibility to choose from a wider variety of video input sources. Using a single LAN port, you can access multiple cameras, software on computers, mobile devices, and more on the network. You can also operate cameras remotely and control tally lights over NDI.

NDI technology uses a proprietary codec and transport method to achieve nearly lossless image quality with no latency. This also means that NDI requires very high network bandwidth. For example, a single 1080p stream at 30 fps needs at least 125 Mbps of dedicated bandwidth. The more efficient NDI|HX uses H.264 video compression and requires less bandwidth, but it's still a higher requirement than with SRT streaming. An NDI|HX stream of similar quality will require 10–20 Mbps of bandwidth, whereas SRT would only need 2–8 Mbps.

Until recently, these high bandwidth requirements meant NDI-based video workflows were only plausible over stable local networks. Then NDI 5 came along.

NDI 5

The release of NDI 5 has the potential to change the game entirely. It introduces a feature-rich set of tools that make NDI-based video production and contribution possible over the public Internet. For example, the NDI Bridge tool connects two remote NDI networks together, while the NDI Remote tool allows anyone to contribute live audio and video from a camera phone or a web browser using a URL.

When to use NDI

NDI (versions 4.x and lower) is an efficient way to stream and produce video over local networks. It's the preferred method of IP video transmission inside most buildings. NDI 5, on the other hand, was developed specifically for sending video over the public Internet.

Some devices, such as certain PTZ cameras, are "NDI-ready," which means they become discoverable on the network as soon as they are connected to it. Other devices may require additional setup. For example, cameras with an HDMI or SDI out will need an NDI converter, while most computer screen capture applications will require a free NDI conversion tool. Some video conferencing tools (e.g., Skype, Microsoft Teams, Zoom Rooms) offer direct NDI high-quality output for use in productions. Additionally, motion graphics and titling programs such as NewBlueFX use NDI Alpha channel output to add semi-transparent lower thirds and animated graphics to productions.

The latest version of the technology, NDI 5, makes sending video over the public Internet possible. With its implementation, the video contribution workflow becomes similar to that of SRT. NDI 5 is still in beta, but it's only a matter of time before it becomes a viable way to connect to virtually any audio or video device in the world.

NDI benefits

- Nearly lossless quality with no latency
- All video sources are readily accessible from anywhere over the network, making remote production workflows within the same studio safe and more efficient
- Eliminates SDI/HDMI cables and switches, offering cost-effective video production over LAN
- With NDI 5 fully unrolled, producers will be able to connect to virtually any piece of audio or video equipment in the world

SRT and NDI: Joint applications

Sometimes it makes sense to use both SRT and NDI. For example, let's consider a large production studio that receives remote video contributions. This could be a TV studio conducting a remote interview, a hybrid conference event, or a government hearing featuring remote testimonials. In this case, it would make sense to bring in the remote video contribution over SRT and use NDI to transmit video locally inside the studio.
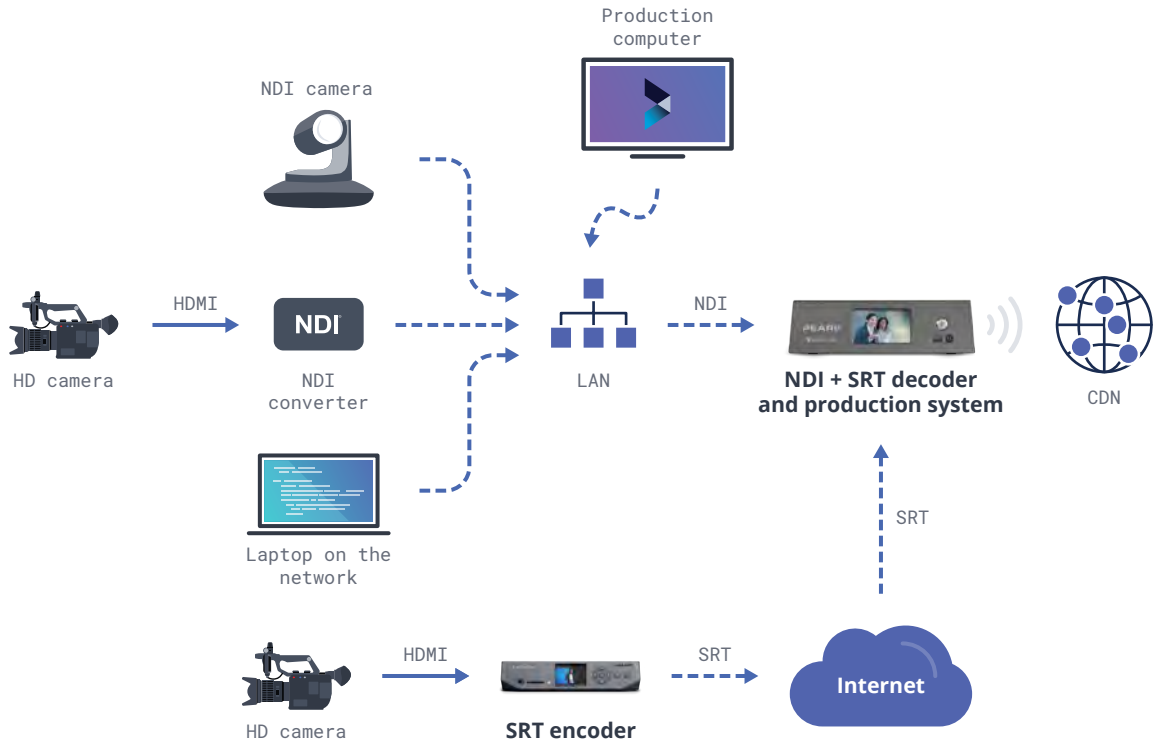
Harness the power of SRT and NDI with Pearl-2

With both SRT and NDI support, Pearl-2 is ready to adapt to your remote production workflow. Discover what's possible at epiphan.com/pearl-2.

Pearl-powered productions: Putting SRT remote contribution to the test

Earlier this year, live streaming experts Aaron Parecki, John Barker, Curtis Judd, and PhotoJoseph set out to test the SRT capabilities of their Pearl encoders. The four participants were scattered across the globe, and the goal was to bring them together on a single live stream. Three of the four remote participants contributed an audio and video feed from their local Pearl Nano encoder to the fourth participant's Pearl-2 production encoder.

What is SRT?

Secure Reliable Transport (SRT) delivers high-quality video and audio with low latency over the unreliable public Internet. More than just low latency, SRT lets you actually control the latency and tune out issues like jitter due to packet loss over poor networks. The ability to deliver high-quality content in near real-time over the Internet gives broadcasters a viable alternative to expensive satellite technology. SRT can also traverse firewalls, minimizing or eliminating the need to engage a network administrator.
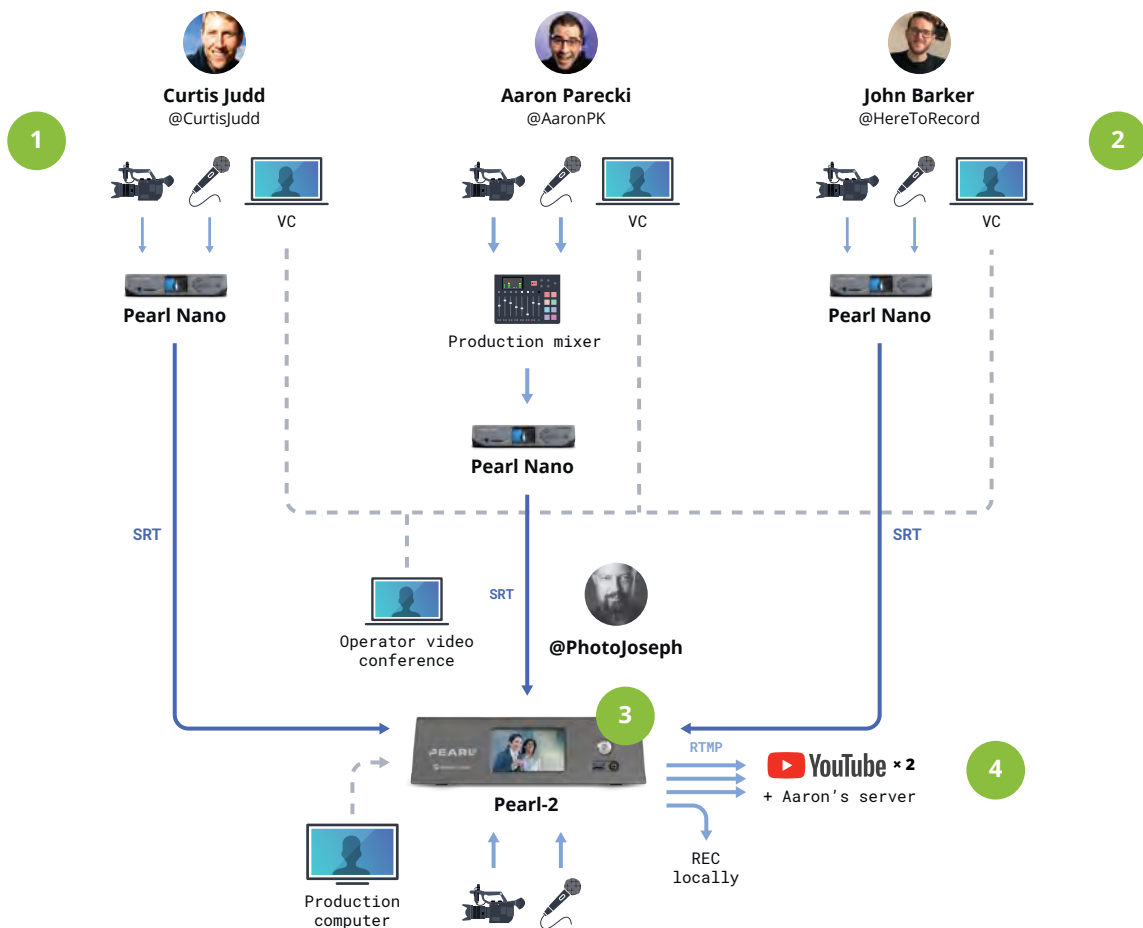
1. Each participant had a professional camera and microphone connected directly to their Pearl or through a production switcher.

2. Because SRT is best suited for one-way video contribution rather than two-way communication, the team used video conferencing (VC) software for real-time communication.

3. PhotoJoseph's Pearl-2 served as the central production hub, receiving all SRT feeds and recording and streaming. During the event, he swapped between layouts on the fly with Pearl-2's live switching capabilities.

4. PhotoJoseph was streaming from Pearl-2 directly to two of his own YouTube channels. An additional RTMP stream was going from Pearl-2 to Aaron's home gigabit network server for restreaming to the other participants' YouTube channels.

The result: High-quality, low-latency streaming

Sub-second latency

Even though the four participants were thousands of miles apart, they achieved sub-second latency via SRT. Measured with relation to PhotoJoseph, Aaron came in 0.46 seconds behind, Curtis was at 0.72 seconds, and John's streaming latency was 0.87 seconds. These results are even more impressive when you consider that John was streaming from a remote rural area in Sweden using an unpredictable 4G connection.

Excellent video quality

Multiple viewers noted the excellent audio and video quality of the stream. Some even expressed doubts as to whether the production was live.

Pearl-2 barely broke a sweat

Even while receiving three 1080p SRT streams, sending three 1080p RTMP streams, and recording locally, Pearl's CPU load only reached 30 percent. This result surprised producer PhotoJoseph: "Pearl hardware is pretty efficient in this regard. Actually, I am really impressed with that. I expected that to be higher."

Applications for remote contribution using SRT encoders

Remote contribution kits for live interviews

In this scenario, the producer ships a small production kit consisting of a camera, a microphone, and the contribution encoder to the talent or their team. After the local team or the talent sets up the kit, the producer is ready to stream or record content. PhotoJoseph said, "It's pretty easy to configure because everything is done through a web platform. You could remote connect into somebody else's Pearl… and do all the configuration and switching remotely. You could ship out a kit… Tell them to plug it into their network and you take over from there."

Home streaming studios for corporate executives

For frequent video contributors like executives, a permanent studio in their home or office might make sense. The same low-touch principles would apply: minimal device interaction for the executive, maximum remote control for the producer. As Curtis Judd put it: "Certainly, in education and corporate settings, it makes a lot of sense to use [Pearl Nano] because I am not going to go to an executive's house and teach them how to do downstream keys and live switching. I want to be able to control all that remotely."

Assisted live lecture and training production

Both permanent and ad hoc lecture spaces could benefit from a preconfigured hardware encoder. After setting up the encoder, the presenter is free to focus on the presentation while a remote producer assists with the live production.

Discover the full potential of Pearl SRT support

Check out **epiphan.com/srt-support-for-pearl** to learn more about the advantages of SRT support on Pearl and download the complete Pearl SRT application note.
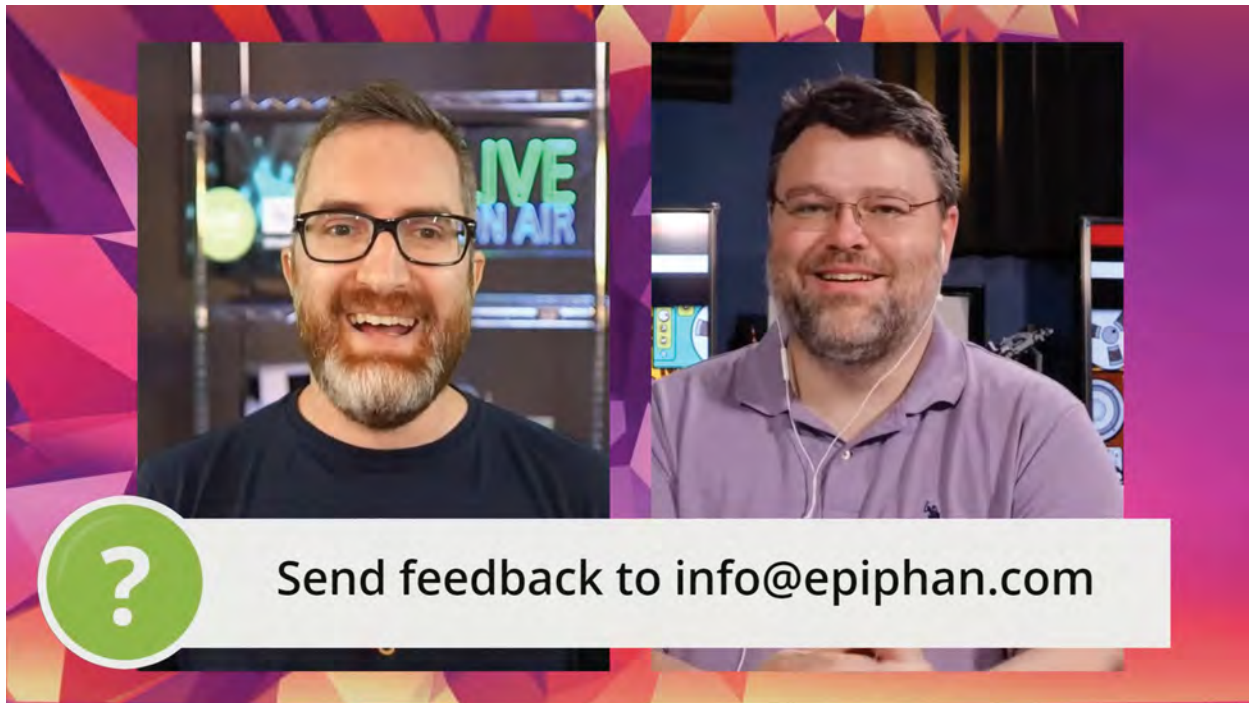
EXPERT
INSIGHTS

Three trends defining corporate video production in 2021 and beyond

How has corporate video production changed over the last year, and what does the future hold? That's the question we put to five corporate video pros. Their answers revealed several key themes.

1 If your company isn't live streaming, you're missing out

Uptake of video conferencing tools reached new heights in 2020 with the sudden shift to a distributed workforce. But the reliability and video quality limitations of such solutions quickly became evident. For example, virtual events like product demos and CEO addresses call for a certain degree of production sophistication that video conferencing apps just can't provide. In situations like these, where the level of visual integrity has a significant influence on brand image, live streaming became the answer.

"Live streams, for many companies, changed from a luxury to a necessity to keep their businesses healthy and to keep their workforce and customers engaged. There's a psychology behind the higher-quality video experience, especially when it comes to things like sales and customer meetings. There's a kind of a natural communication of credibility. It's not just a nicer looking video which just warms our hearts, there are actually some psychological things too that kind of increase credibility."

Curtis Judd
Video Specialist at Light and Sound Media LLC

Companies that were quick to adopt live streaming as a part of marketing efforts realized greater sales impact. For example, after the pandemic started, Epiphan Video ran 40 webinars over nine months, which 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.

Experts expect to see live streaming become an integral part of the marketing stack in the future. The expertise gained during the pandemic will lay the groundwork for the new live storytelling and presentation standards.

"I have no doubt that live streams will continue to trend as a valuable tool in the overall toolbox for businesses. Live streams are far more efficient at connecting and engaging workforces and customers, and innovative and forward-looking businesses will continue to invest in live streaming alongside in-person meetings and conferences."

Curtis Judd
Video Specialist at Light and Sound Media LLC

2 Low-quality virtual event productions no longer cut it

It's easy to underestimate the adverse effects poor video quality has on engagement, viewer retention, and brand image. However, as the popularity of remote communications increased, so did expectations of audio and video quality. While forgivable for an internal video conference call, poor AV quality is unacceptable when broadcasting externally or to a large internal audience.

Since the majority of such events involve remote guests, the production outcome doesn't depend solely on the professionalism of the video producer. It also depends on the individual image and sound quality of the remote contributors. As a result, those involved in frequent video calls and remote interviews were among the first to feel the pressure to improve their at-home setups:

"Viewers get very upset when they are forced to watch low-quality video and bad audio. C-suite executives, who understand the value of excellent presentation and first impressions, were among the first to recognize this. As a result, we saw a shift toward executives being eager to install high-end AV equipment in their homes and make sure everything works flawlessly."

Wendell Wilson
Wendell Wilson Business Technology Consulting

Realizing the negative impact poor AV can have on viewer engagement and brand image, forward-thinking companies equipped their employees with the right technology for best results:

"Excellent production quality, distribution, and scale are no longer a 'nice to have' feature. There is an expectation, at all levels of an organization, for media to be professionally produced and distributed using new, effective tools and processes. The investment in equipment, processes, and the development of skills to facilitate this was overwhelming. Fortunately, those who were able to adapt effectively were able to dramatically improve the efficiency and effectiveness of interactive audio/visual presentations to support virtual events."

Tim Dougherty
Director, Sales Engineering at Wowza Media Systems

Experts predict that, going forward, marketing departments will put more emphasis on live video production and remote video contribution, treating it like another element of brand communication. Likewise, the demand for remote video production professionals who can facilitate a successful virtual event will continue to grow.

"Corporations will develop more guidance and hardware/graphics packages for their employees so they can ensure great quality while staying on brand."

John Moore
Lead Technology Architect & Microsoft MVP
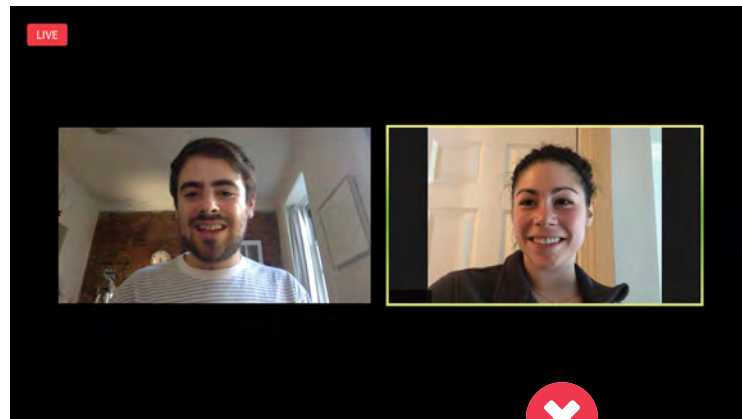
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Massive changes are coming to the live video industry as disruptive forces loom

The line between live streaming and video conferencing is blurring, with both being used to enable virtual events. Still, these tools alone are not meeting all the demands for interactivity, interconnectivity, engagement, and ease of use in their current state. This situation presents massive opportunities for new products and services, which could help the distributed workforce become more connected and productive, and companies to engage with their customers better.

"I believe meeting, recording, and live streaming platforms will continue to make it more accessible to deliver content that is engaging for both in-person and remote audiences. I think one area to watch will be if meeting platforms and presentation tools converge. I am hopeful that the lines between your meeting client and your presentation software will blur as dynamic elements in meetings can find their way into your slides/demos, and prepared content can more natively integrate into the 'stage' where you are delivering to the audience."

John Moore
Lead Technology Architect and Microsoft MVP

New products and services emerging from the intersection of traditionally disparate tools could completely reshape the video communications landscape in the next few years.

"Ultimately, I believe that in 2022, we will witness more overlap between collaboration tools, VC software, and video streaming. It will define an organization's work culture. Information will be available and accessible throughout an organization, and the democratization of ideas and solutions will make for stronger companies with higher employee satisfaction."

Ishak Kang
Head of AV at KD Infotech

Discover the power of Pearl for corporate video production

Pearl has all the features needed to create broadcast-quality communications without traditional complexity, empowering the next generation of content creators within organizations of every size. Visit epiphan.com/solutions-for-corporate to learn more.

Video compression cheatsheet: H.264/AVC vs. H.265/HEVC

H.264, also known as Advanced Video Coding (AVC), has long been the dominant video compression standard. Today most live streaming platforms use it for playback, and it's the codec of choice for over 90 percent of video industry developers.[1] But there's been a lot of buzz in recent years about H.265, or High-Efficiency Video Coding (HEVC).

The whole point of H.265 is to succeed H.264. So why isn't everyone using it? Because H.265's higher efficiency comes with a steeper computational power requirement. That doesn't mean you should rule out H.265 for your own productions, however.

1 Bitmovin. *2020 Bitmovin Video Developer Report*. 2020.

Where H.265 excels

H.265 is more efficient than H.264 at compressing information, resulting in video files of comparable quality that are about half the size they would be with H.264 compression. The benefits of this are twofold: H.265 video files don't take up as much storage space, and they require less bandwidth to stream. This is a big advantage especially when it comes to storing and streaming 4K video content.

H.264 vs H.265: Average bandwidth required per resolution[1]

|	H.264 MPEG-4/AVC	H.265 HEVC
Resolution	**Bandwidth required**	**Bandwidth required**
480p	1.5 Mbps	0.75 Mbps
720p	3 Mbps	1.5 Mbps
1080p	6 Mbps	3 Mbps
4K	32 Mbps	15 Mbps

1   FaceofIT. *H.264 vs H.265 – What's the Difference? Specifications and Video Format*.

What accounts for this difference is how each video standard processes frames. H.264 uses what are called macroblocks, processing units that span 4×4 to 16×16 pixels. H.265 uses a newer block structure called coding tree units (CTUs), which can process sizes of up to 64×64 pixels. There are other technological enhancements at work, but the shift from macroblocks to CTUs is a major contributor to H.265's greater efficiency.

Codecs 101

It's a term you'll hear often in the streaming world and probably use a fair bit yourself. But what even is a "codec"?

A video codec is a process for compressing and decompressing video data. There are also audio codecs that do the same for audio. The term itself is a combination of the words "coding" and "decoding."
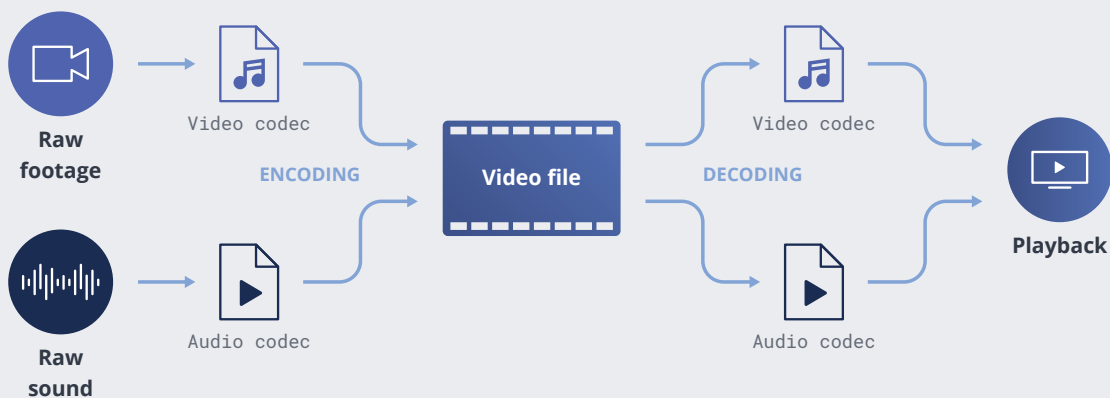
Codecs are often confused with containers. For video files, that means formats like AVI, MOV, or MP4. The distinction is this: A container holds the compressed video and audio and any other components of the file, such as metadata or subtitles. The codec comes into play at the start, determining how the raw footage and sound are compressed within the container, and decodes the file when needed for playback.

There are lots of different video codecs out there. MPEG-2, JPEG2000, and VP9 are just a few you might hear about. But when it comes to video codecs, H.264 and H.265 get the most attention.

Codecs come in two classes: lossless and lossy. During playback, lossless codecs completely reconstruct the compressed data while lossy codecs serve up only an approximation. It's a trade-off between quality and playback experience, with lossy codecs offering much smoother playback that might include interpolation and other compression artifacts. Streaming lossless media isn't feasible for most Internet connections, which is why lossy codecs like H.264 and H.265 are the standard online.

The trade-off for more efficiency

What H.265 offers in efficiency it demands in processing power. Advanced hardware is needed not only to create H.265 video files but also to decode them for playback. This limits who can benefit from H.265's superior efficiency to those with the right gear. It's why H.264 is still the go-to codec for many.

That said, there are plenty of current-day video applications where H.265 encoding is an asset, particularly those involving 4K. Plus, the audience of content consumers with H.265-capable hardware continues to grow. It's only a matter of time before H.265 fulfils its purpose and succeeds H.264.

Pearl Nano – now with H.265 video compression

The perfect-fit streamer and recorder can now encode and decode using the highly efficient H.265 video codec in addition to H.264 and Motion JPEG. Visit **epiphan.com/nano** for more information about the optional feature add-on.

Power up your Pearl Nano with 4K and H.265/HEVC

With a versatile feature set packed into a very small package, Pearl Nano already empowers you to produce great-looking content. Now you can add dazzling 4K video and ultra-efficient H.265 encoding to the mix. Here's why these capabilities are gamechangers for anyone with a Pearl Nano.

The 4K advantage

The most obvious benefit of 4K streaming and recording is better image quality. But a higher-quality picture isn't the only benefit of all that resolution real estate.

On the post-production side, 4K recording unlocks a ton of versatility. Because there are so many more pixels to play with, you can zoom or crop a 4K frame to produce a stunning 720p or 1080p image. You could even make a single-camera production appear like a multi-camera one.

Say you wanted to film a city council session. You're using a Pearl Nano with 4K enabled and a 4K-capable camera. Rather than a traditional wide-angle shot, you could add close-ups of multiple counsellors to a layout, all from a single camera feed.

H.265: The perfect 4K complement

H.265, or High-Efficiency Video Coding (HEVC), is the intended successor of H.264, also known as Advanced Video Coding (AVC). The difference between these two video compression standards boils down to this: H.265 is far more efficient at compressing information than H.264, resulting in video files that are about half the size with about the same visual quality. (For a fuller breakdown, see our write-up on page 21.)

It's easy to see how this capability rounds out 4K streaming and recording on Pearl Nano. All those extra pixels lead to large video files that are difficult to store, transfer, and work with. H.265 can halve the size of that content while preserving the visual clarity that makes 4K video something to behold. Even when you're not shooting in 4K, H.265's superior efficiency can come in handy – for example, when you're at a conference center or remote location where bandwidth is costly, or using a mobile connection.

More and more content delivery networks (CDNs) are supporting H.265, and others will follow suit over time. Those that already do offer smoother playback that's easier on the bandwidth. A highly efficient codec like H.265 will be essential as support and the appetite for 4K streaming continues to grow.

Pearl products continue to evolve

The addition of 4K and H.265 to Pearl Nano is just the latest update to come to the Pearl line of video production systems. We're always at work on new features and enhancements, supporting your workflows and ambitions with an ecosystem of innovative products that evolve to meet your needs.

Do even more with Pearl Nano

Bring 4K video and H.265 encoding to your Pearl Nano productions with the optional feature add-on, available at epiphan.com/nano.

Investing in video technology:
Five tips for post-secondary schools

By Mike Sandler, President & CEO, Epiphan Video

Few sectors have embraced video quite like education. Colleges and universities the world over use it to augment programs or make them available to students outside their local markets, among other applications. Of course, campus closures over the last year prompted many schools to leverage the medium more than ever. But even before the pandemic, the trend toward video in education was clear.[1]

1 Kaltura. *The State of Video in Education 2019.*

The result is an education landscape that is increasingly digital and, consequently, without boundaries.[2] Whereas in the past post-secondary students had to relocate to study at faraway institutions, today distance learning and remote continuing education programs are plentiful. A majority of students can now virtually attend college or university in another city or country right from home, wherever that may be.

All of this is to say nothing of the expectations of students on campus for things like lecture recordings and hybrid programs that let them attend classes in person or on demand.[3]

How to shop for AV solutions

Understandably, broader competition in the education sector has spurred many institutions to establish a campus-wide video infrastructure made up of cameras, audio systems, encoders, and the like. This is no small undertaking. As with any large technological implementation, the possible pitfalls are numerous and the potential for indecision considerable.

Questions abound: What solutions will meet our needs? How will we manage it all? How will faculty, students, and staff take to the new technology? Is it a smart investment?

Should you find yourself with the challenge of selecting video production solutions for a campus-wide deployment, here are some tips to ensure a successful implementation.

2   Inside Higher Ed. *Online Education Ascends*. November 7, 2018.

3   Journal of College Teaching & Learning. *Student Usage and Perceptions of the Value of Recorded Lectures in a Traditional Face-to-Face (F2F) Class*. Volume 13, Number 3, 2016.

1 Work back from your applications

Lecture capture, remote learning, flipped and hybrid classroom programs, virtual office hours – the list of applications for video in education goes on.

Poring over data sheets and tech specs on marketing pages, it can be hard to know what features your school will need. That is why it's useful to think in terms of applications, defining clearly what you wish to accomplish and working back to your technical requirements from there.

For video specifically, there are a few key considerations:

- **Inputs:** How many does your application require, and what kind (e.g., PTZ cameras, a laptop or tablet, a video microscope)?
- **Outputs:** In what format do you wish to output your sources – as distinct files that can be edited together, or as a single program? How will your content be delivered and stored (e.g., via a content management system like Panopto or Kaltura)?

- **Capabilities:** Will operators need the ability to switch between sources (i.e., from one camera to another) during production? Is automation desirable, or are in-room controls required, or both?

Once you understand the requirements of your target applications, you can narrow your consideration to solutions that meet them.

2 Look for simple to manage

Any technology you bring onto campus will take up IT time. You can control how much by favoring solutions that minimize complexity and troubleshooting.

It starts with deployment. Should the solution need network access, is it simple to install on your campus network and to keep it secure? Could you easily add units to meet growing demand? Consider also the post-deployment picture. Is there a way to centrally manage connected hardware such as encoders, or will IT have to trek across campus (or to another campus altogether) to diagnose problems or upgrade software?

3   Put end users first

IT will manage the technology, but it is instructors and students who will use it every day. Inevitably, you'll find great diversity in both groups when it comes to technical proficiency, making ease of use paramount. Look for user-friendly interfaces, good documentation, and seamless workflows enabled through direct integrations or APIs.

4   Consider compatibility

Most institutions looking to build a video infrastructure won't be starting from zero. There will be past AV investments on hand: various cameras and microphones, control systems, perhaps a content management system (CMS) already deployed, and almost certainly a learning management system (LMS) in place.

Compatibility with present assets like these should be a key factor when assessing solutions. When considering a video encoder, for example, you'll want to ensure the system in question includes all the right input and output ports to connect your existing equipment.

Perhaps the biggest compatibility to verify is with your LMS or CMS. Built into some solutions is what's called a vendor lock, which restricts the use of said solutions to a particular platform. The idea of a solution built specifically for your chosen platform may sound appealing at first, but consider the practical limitations. What if, in the future, your platform of choice no longer meets your school's needs? And suppose a competing platform offers features your end users have been clamoring

for yet are not even on the roadmap for your current vendor. To migrate would require ripping out and replacing any vendor-locked solutions – an expensive proposition, and one you can avoid by favoring open-platform hardware.

5   Think long term

Like any business, schools must think always in terms of ROI. A campus-wide video infrastructure is a significant investment. Look for products that will last and deliver returns into the future.

This is critical especially for hardware investments. Not all are created equal. Favor brands trusted for the reliability and longevity of their products. Then investigate factors such as customer support quality and available warranties, and, if applicable, the vendor's track record for supporting solutions with firmware updates.

The right solutions are out there

Increasingly, taking a competitive stance in education calls for a high-performance video infrastructure that meets the needs of IT and end users alike. Finding solutions that fit is the first step, and I hope my advice has set you on your way to doing just that.

Of course, there is no need to go it alone. A partner with deep technical knowledge and experience in the area could be invaluable in your search and deployment. We are always happy to lend such support.

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PEARL²

PEARL MINI

epiphan cloud

LIVE|SCRYPT

PEARL NANO

Enter the Ecosystem: Epiphan solutions for large deployments

Some organizations need just one video encoder, or two, or three. Others need many more, spread throughout a facility or distributed across several. Here a complete solution for device management is a must, for efficiency and to allow scaling without headaches. That's the idea behind the Epiphan Ecosystem, a lineup of powerful, scalable AV products – all centrally managed.

The Epiphan
ECOSYSTEM

A lineup of powerful, scalable AV solutions – centrally managed.

Pearl Nano
The perfect-fit streamer and recorder

LiveScrypt
Dedicated automatic live transcription

Pearl-2
Ultimate all-in-one video production system

Pearl Mini
Simplified live video production

Your command center for everything Epiphan

With Epiphan Cloud's centralized device configuration and monitoring capabilities, it's simple to manage multiple, distributed Pearl and LiveScrypt systems.

The Pearl-equipped campus

Colleges and universities use video for a broad range of applications, from lecture capture and school event streaming to flipped and hybrid classroom content. With its multiple video encoder models, the Epiphan Ecosystem offers schools solutions to fit any campus space or use case. Plus, LiveScrypt's automatic real-time transcription can help institutions make their programs more accessible to students who are deaf or hard of hearing.
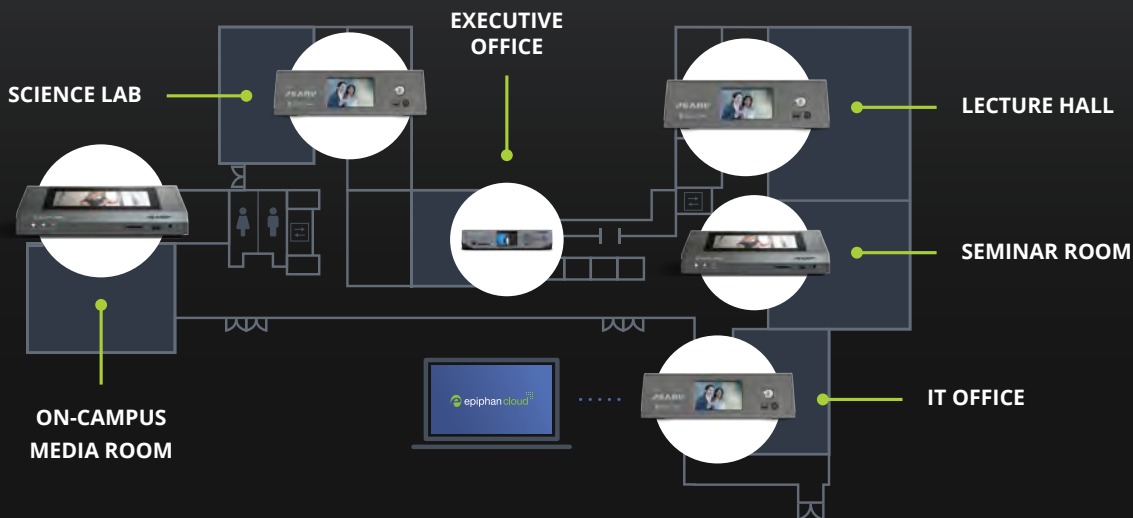
The far-flung fleet

There are no do overs in live event production, which makes reliable gear a must. At the same time, transporting equipment between venues, across city lines, and over oceans can take its toll on hardware – and makes for a truly distributed fleet. The Epiphan Ecosystem offers live event production teams rugged and dependable solutions and the tools to configure and monitor devices remotely, wherever they are in the world.
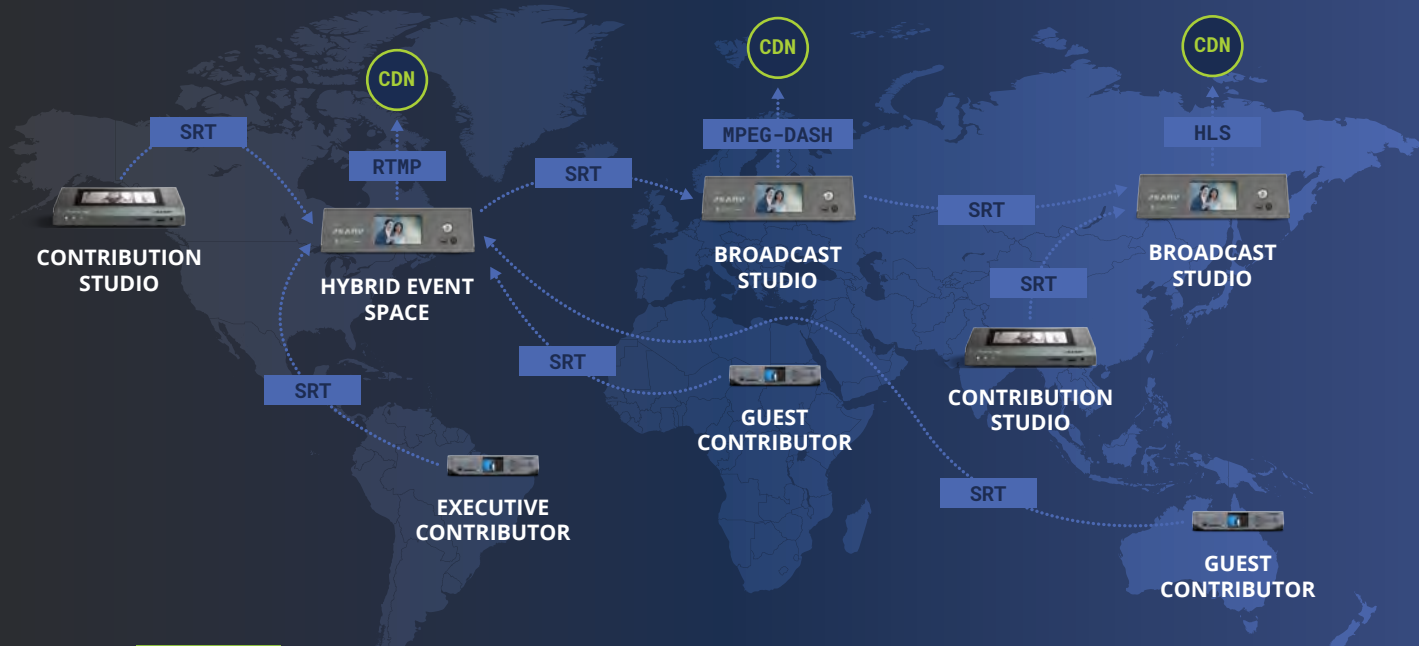
Why companies choose Epiphan for large deployments

Deploying a fleet of video encoders can be daunting. The products have to be easy for everyone to use. Managing it all can't take up too much IT time. And of course, it has to justify your investment.

The Epiphan Ecosystem is up to the task. Here's why you should consider Epiphan solutions as the backbone of your video infrastructure.

Simplify video for everyone

Easy-to-use Epiphan solutions make video production accessible across your organization. Intuitive features and controls ensure a frictionless experience for end users, while advanced capabilities give teams the tools they need to securely deploy and efficiently manage multiple devices.

Multi-device management made easy

Real solutions make life easier by minimizing complexity, not adding to it. That's why Epiphan's purpose-built products are designed to streamline AV infrastructure management. It starts with IT-friendly networking features that simplify deployment. After installation, robust software and rugged hardware components keep troubleshooting and maintenance to a minimum, while a cloud-based dashboard offers a commanding view of the whole fleet.

An ecosystem with the freedom to choose

The Epiphan Ecosystem is an open ecosystem – no vendor lock-ins, no walled gardens, no proprietary protocols. Use the API to build custom integrations that fit your video production environment, or take advantage of direct integrations with Panopto or Kaltura for seamless, ready-made workflows. Whatever your AV environment looks like today, however it evolves in the future, Epiphan solutions will fit right in.

Versatile solutions, consistent experience

Epiphan solutions support a wide range of AV applications, from lecture capture and corporate presentations to live event production and remote contribution. Choose from multiple system models to find the perfect fit for any room or video application. With Epiphan's refined interfaces and exacting design principles, administrators and end users will feel at home no matter the product or use case.

Value for video – and your organization

Your AV infrastructure is an investment. Epiphan solutions pay off with extended lifecycles, firmware upgrades that improve performance and add brand-new capabilities, and the flexibility to evolve with your AV needs. Purpose-built, rigorously tested, and backed by dedicated customer support, Epiphan products are sure to serve your organization for years to come.

We're here to help

During planning and deployment, we bring sales support, product knowledge, and technical expertise to ensure a smooth deployment of Epiphan solutions across your facility.

And we're always just an email or a phone call away. For questions and product demo requests, reach us at **info@epiphan.com**.

Pearl Mini enables smooth transition to distance learning at Bethune-Cookman University

Bethune-Cookman University (B-CU) installed 36 Pearl Mini hardware encoders throughout campus to allow faculty to record lectures from the classroom. With its direct Panopto integration and simplified controls, Pearl Mini was the clear choice for lecture capture and other video applications.

The need: An intuitive classroom lecture capture solution for distance learning

Like many other educational institutions during the pandemic, B-CU had to make a quick transition to distance learning. B-CU Director of Client Services Kofi Jack was tasked with finding solutions for video capture. His main objective was to build solutions that would be non-obstructive and easy for every staff member to use, regardless of their technical ability or teaching style.

When it came to building a lecture capture solution, Jack had the advantage of starting with a clean slate. One of his first decisions was to choose the Panopto content management system (CMS) for video storage, sharing, and distribution.

Panopto includes a tool for browser-based lecture capture, which is a convenient option for recording content at home using a laptop and a webcam. However, not all instructors were used to or even comfortable recording lectures this way. For many faculty members, being able to continue teaching from the familiar classroom environment was crucial. They wanted to write on the board, use the podium, and project into the room, even if there were no students in it. Jack began looking for a classroom lecture capture solution that would accommodate this more traditional teaching style. His top priority was finding an intuitive and hands-off solution that would take little effort and technical knowledge to operate.

Teachers don't want to have to worry about pointing cameras and technical things like volume levels. They just want to get to class and start teaching.

Kofi Jack
Director of Client Services at B-CU

Jack was also considering the student side. The classroom capture videos needed to be clear, engaging, and easy for the students to access. Jack was looking for high-quality, multi-source video capture with automatic recording delivery to Panopto to make this possible.

The solution: Pearl Mini for effortless multi-camera lecture capture

By fall 2020, B-CU had 20 classrooms outfitted with Pearl Minis for lecture capture. Each Pearl Mini captured video from two HD cameras and a computer source, and audio from a ceiling microphone. Several science labs also featured a document camera as a video source.

The client services team registered each Pearl Mini inside Panopto, linking them directly to the CMS. To begin recording, a faculty member would simply log in on the Pearl Mini touch screen using their Panopto credentials and press start. After a session is complete, the lecture automatically uploads to the respective course folder in Panopto.

Results: The hybrid experience beloved by teachers and students alike

Pearl Mini, together with Panopto, became key elements of B-CU's lecture capture solution. Jack's team built a solution that allowed B-CU to pivot to distance learning on time and made all the stakeholders happy.

Simplified instructor's experience

The lecture capture solution allowed instructors to continue teaching from the classroom using familiar methods, sparing them the stress of adapting to a new approach. Jack received feedback from many faculty members about how easy it is to create recordings using Pearl Mini's large touch screen. With the units fully preconfigured and ready for operation, instructors can focus all their energy on teaching.

By taking advantage of the native Panopto integration, Jack's team were able to eliminate any extra steps associated with video file transfer. Lectures upload to the correct depository automatically so both instructors and students can find them.

High-quality lectures and new opportunities for students

Thanks to the lecture capture system powered by Pearl Mini, B-CU students enjoy high-quality, multi-source lecture content.

Additionally, Pearl's streaming technologies present new opportunities to future students in terms of course offerings. These may include the flexibility of an online or hybrid course, the engagement of a live remote guest speaker, or the enrichment of a joint course or event with another university.

Hassle-free implementation and maintenance for IT

B-CU's client services team thought every step of working with Pearl Mini was straightforward, from device installation and setup to operation and maintenance. Although the fleet of Pearl Mini hardware encoders is spread throughout campus, the client services team can save time by managing all units without leaving their seats thanks to Pearl's remote access capability.

The implementation process couldn't have been more seamless for our staff and faculty. I would definitely recommend this solution for classroom lecture capture to other educational institutions.

Kofi Jack
Director of Client Services at B-CU

About Bethune-Cookman University

Bethune-Cookman University (B-CU) is a private, historically black university in Daytona Beach, Florida. Founded in 1904 by Dr. Mary McLeod Bethune, the school is affiliated with the United Methodist Church. The B-CU motto is "Enter to Learn, Depart to Serve."

Pearl Mini for effortless classroom lecture capture

Minimize lecture capture configuration time and maximize teaching time with the intuitive Pearl Mini. For full product details, visit epiphan.com/products/pearl-mini.

LiveScrypt's automatic closed captioning enables accessible programming at Milford TV

Milford TV enables live broadcasting for local organizations in Milford, Massachusetts. The community access station uses Epiphan LiveScrypt to deliver accurate, real-time, and automatic closed captioning feeds to various physical and virtual display mediums, promoting access for in-person and online attendees.

The need: An accurate, real-time closed captioning solution for concurrent delivery to multiple destinations

Milford TV Executive Director Liz Harkins is passionate about helping her community stay connected through technology and media. One of her main goals as station manager is to give the people of Milford the resources they need to create their own content and share their stories.

The Town of Milford is one of the station's biggest clients. Milford TV has been broadcasting and live streaming from the Milford Town Hall for many years. In preparation for an upcoming meeting, the Town's organizing committee asked Harkins to provide a real-time closed captioning solution to improve audio-visual accessibility for constituents.

Due to COVID-19 venue capacity limitations, the Town planned to conduct the meeting as a hybrid event. The core group of participants would meet in the upper town hall while all other participants and attendees would join over Zoom. A composite live production featuring dynamic switching between the various cameras and the Zoom meeting would be broadcast to the public access station, streamed live on the Internet, and displayed on in-room monitors.

For the real-time closed captioning component, the plan was to transcribe the in-person and the Zoom participants' speech simultaneously and display transcriptions as a text overlay on the broadcast, live stream, and in-room monitors. The efficiency of any collaborative hybrid event relies on timely input from participants, so the closed captioning component had to be as accurate and delay-free as possible.

Another requirement for the solution was ease of use. With limited staff, the station is always looking for solutions that won't require much training and will be easy for others to learn how to use. Finally, it was important to the small local government to stay within budget.

The solution: LiveScrypt, a transcription device with customizable text overlay output

After spending some time searching for a closed captioning encoder, the station's technical supervisor, Daniel Harlow, discovered LiveScrypt. Compared to the alternatives, it was more accurate, better priced, and had a feature set that fit the station's needs.

LiveScrypt received the combined audio output from the auditorium mixer via XLR. This signal included the audio from both the speakers in the auditorium and the Zoom meeting participants, allowing the device to transcribe both. Next, LiveScrypt's HDMI output delivered the transcription to a production mixer, where it was added as a text overlay to the online stream, public broadcast, and in-room monitors.
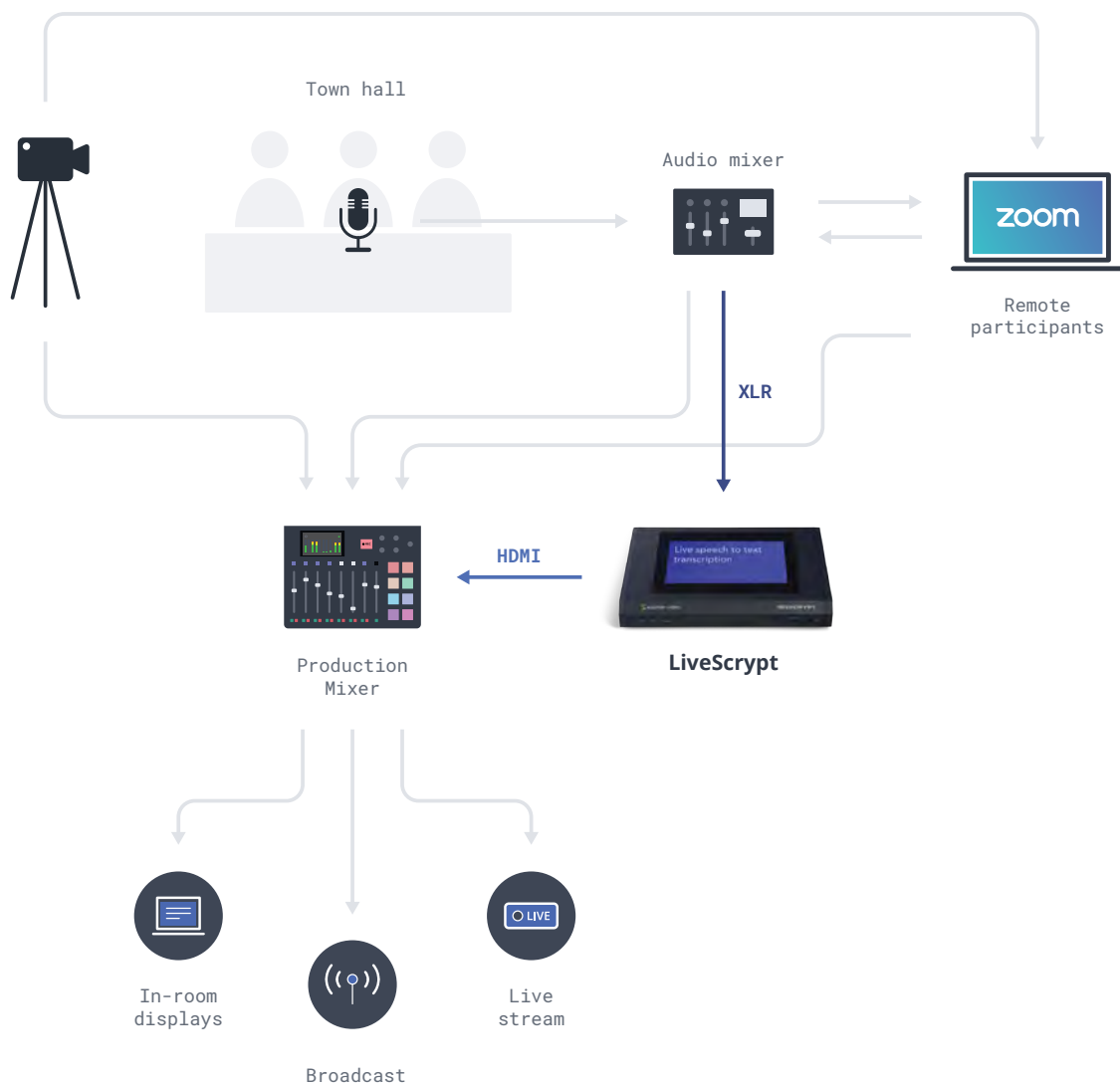
The results: Automatic meeting transcription, accurate captions for viewers

Milford TV first implemented LiveScrypt as the closed captioning solution for the Milford Board of Selectmen meeting. "LiveScrypt is really straightforward in how it works and it's very easy to set up," says Harlow. "We had LiveScrypt up and running live transcription in 10 minutes. Having closed captioning being the least of our problems was a wonderful feeling." LiveScrypt's user-friendly interface also helped minimize training time, allowing Harlow to teach other staff members how to operate the device faster.

It was important for Milford TV to achieve a high level of transcription speed and accuracy during the government stream. The on-screen text overlay was able to follow the audible speech with minimal latency and over 95 percent accuracy, allowing the in-person and virtual attendees to follow the discussion in real time.

Harlow and Harkins noted the degree of flexibility LiveScrypt offers. For example, LiveScrypt's text customization and output options allowed Milford TV to tailor the appearance of the transcribed text and embed it into Zoom meetings, add it to live broadcasts, and display it on in-room monitors.

I love the functionality of LiveScrypt. The accuracy is fantastic, and the flexibility is where it really hits home. We are able to use LiveScrypt for broadcast and in-person events, all in real time. If I can use something for more than one purpose in more than one way, I'm drawn to that item.

Liz Harkins
Executive Director at Milford TV
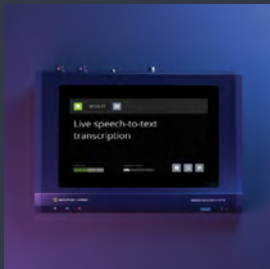
Epiphan Pearl Nano™

Use as a powerful and reliable video distribution device, contribution encoder, or streamer and recorder add-on to a full production switcher.

HD

1920 × 1200 - 60 fps

Epiphan Pearl Mini™

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

HD

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.

4K

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 Video products

Epiphan AV.io 4K™

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

4K

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.

HD

1920 × 1080 - 60 fps

Epiphan AV.io SDI™

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

HD

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.

HD

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.

HD

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.

HD

2560 × 1600 - 85 fps
2048 × 2048 - 85 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.
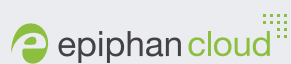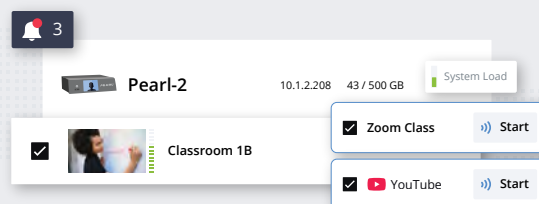
HD

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

Epiphan Cloud™

Your command center for everything Epiphan

INSIDE EPIPHAN

The riders of Epiphan

Outside Epiphan, our team members get up to a wide range of hobbies: photography, gardening, knitting, breadmaking, and many more. But there's one pastime that captivates and unites a big group of us: motorcycles.

The Epiphan Moto Enthusiasts company chat is always buzzing with discussions of upcoming test drives (the Royal Enfield Meteor 350 seems to be on everyone's list), banter over which bike is the best (the correct answer is Honda Gold Wing, if you're wondering), and plans of the next collective event.

One such event has a special place in the hearts of the club members and many of Epiphan's employees. The Ride For Dad initiative and its charitable arm, the Prostate Cancer Fight Foundation, are on a mission to save men's lives by funding prostate cancer research and raising awareness about the disease across Canada. One year, a group of Epiphan employees joined in the massive motorcycle parade through the city of Ottawa, Ontario, and live streamed the event on our YouTube channel. Although this year the parade part has been downsized to solo rides, many Epiphan employees still took part and raised money for the cause.

"Ride for Dad combines my three passions: charity, motorcycles, and supporting a cause I believe in," says George Herbert, one of Epiphan's most avid motorcycle enthusiasts. Epiphan is proud to support Ride for Dad and its mission, and we encourage everyone to check it out online at ridefordad.ca.

Much like the Epiphan moto club members, who are counting down the days until they can ride together again, we are counting the days until we can connect with you in person at a trade show or industry event. So be sure to stop by, and let's chat about how no road is too long when you have good company.

In the spotlight

Marta Chernova

Customer success specialist and jane of all trades

Drawing on a diverse skill set and deep creative streak, Marta Chernova has a hand in the full range of marketing content and collateral Epiphan produces. That includes everything from writing blog posts and video scripts to designing brochures and infographics – not to mention authoring many of the articles you'll read in *EVolution*.

But what her role really amounts to is facilitating customer success. "Our products aren't just boxes of features; they're solutions to problems," Marta says. "A big part of what I do is help people discover our products as the solutions they've been dreaming of."

Nowhere is this clearer than with Epiphan success stories. Each tells how a customer in a certain industry applied Epiphan solutions to their AV problems to great success. Before writing one, Marta meets with the stars of the story to learn more about their organizational aims and how they found our products. The resulting piece can help businesses in similar straits see how peers tackled familiar problems.

That kind of success enablement is one of the most gratifying aspects of working at Epiphan, Marta says. And that extends to her content writing. "It's always a satisfying feeling when someone tells me they found an article or video I wrote and it answered the exact question they had."

Along with content creation, Marta's role also includes regular appearances on our live show and webinars. Whatever the task, Marta strives to inject a bit of humor and lightheartedness. "If I can help you learn something useful and entertain you at the same time, I've done my job."

Our products aren't just boxes of features; they're solutions to problems. A big part of what I do is help people discover our products as the solutions they've been dreaming of.

Marta Chernova
Customer success specialist

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@epiphan

LIVE

TWICE MONTHLY ON
THURSDAY
3PM ET

EPIPHAN WEBINARS

Practical tips and expert advice for pro AV
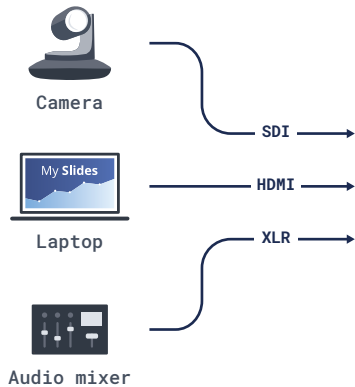
epiphan.com/webinars

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

Camera — SDI →

Laptop — HDMI →
My Slides

Audio mixer — XLR →

PEARL NANO

● REC   Record to SD card or SSD

OUTPUT YOUR VIDEO

RTMP/HLS/ DASH/SRT → Live stream to any CDN

HDMI Program out → Confidence monitor
My Slides

HDMI Pass-through → In-room display
My Slides