WOWZA

LOW-LATENCY STREAMING TECHNOLOGIES

The Key to Interactive Video Experiences

Table of Contents

02 Introduction

03 What Is Interactive Live Streaming?

04 Interactive Video Use Cases

- Real-Time Entertainment and Second-Screen Experiences
- Gaming and Esports
- Live Commerce and Auctions
- User-Generated Content and Social Media
- Interactive Fitness
- Internet of Things (IoT) and Video-Enabled Devices
- Gambling and Betting
- Anything and Everything

12 Critical Capabilities

- Low Latency
- Scalability
- Two-Way Engagement

15 Low-Latency Streaming Protocols

- RTMP
- RTSP
- SRT
- WebRTC
- Low-Latency HLS
- Low-Latency CMAF for DASH

17 Interactive Video Infrastructure

18 Customer Snapshots

19 Conclusion

Introduction

Passive media consumption is a thing of the past. The battle for eyeballs has transformed into a battle for participants. And by letting end users engage on their own terms, content distributors are driving innovation across every industry.

Cue in interactive streaming. Today's broadcasters are combining low-latency video delivery with two-way capabilities to build unique streaming experiences that let viewers directly influence content in real time.

So, what exactly falls in the realm of interactive streaming experiences? Anything and everything.

In the consumer world, there's digital fitness and live commerce. But interactivity isn't just for fun and games. Bidirectional video-enabled devices now play a role in industries ranging from health care (think robot-assisted surgery) to emergency response (think search-and-rescue drones).

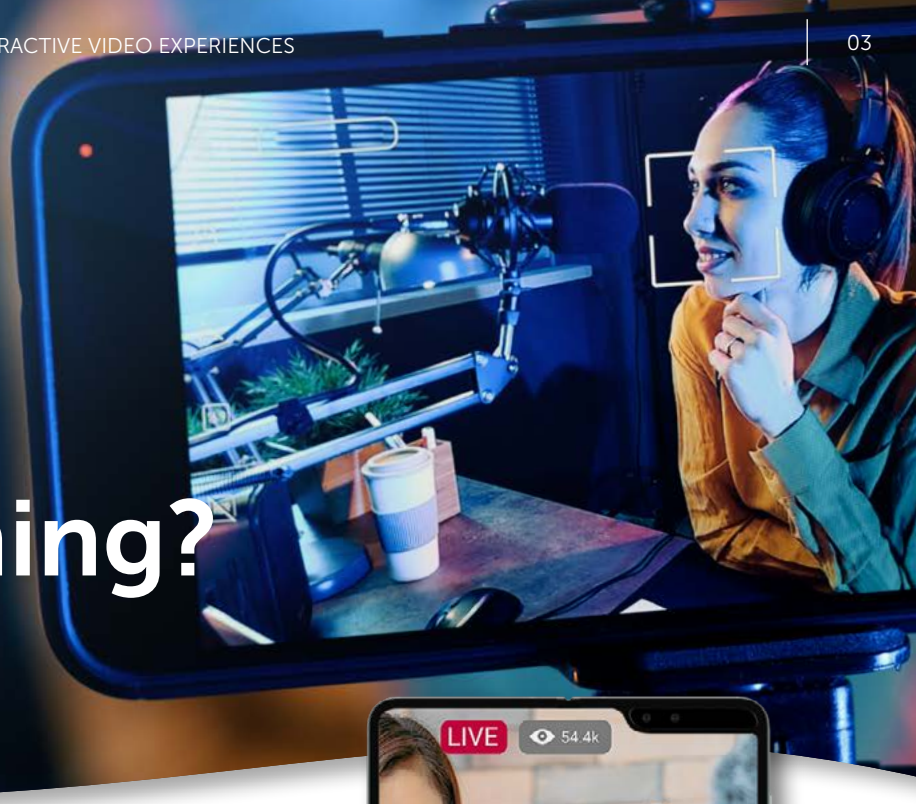
And the COVID-19 pandemic has only accelerated this trend. For one, we're stuck at home, consuming more video than ever before. A recent study shows that daily content consumption has doubled across every digital channel in 2020. What's more, there's now a fundamental need for technologies that replicate in-person interactions. Business continuity, public safety, and day-to-day activities all now depend on live streaming.

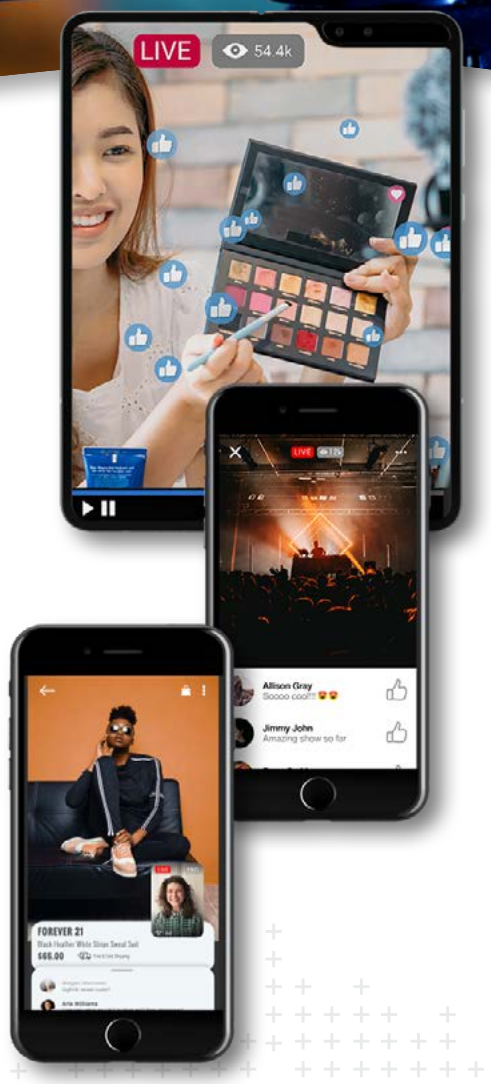
This report takes a look at interactive video in its many forms and the magic behind it: low-latency streaming. But to start, let's define the concept and explore where it's gaining traction.

Happy streaming,

Traci Ruether
Content Marketing Manager
Wowza Media Systems

What Is Interactive Live Streaming?





Interactive live streaming is the combination of internet-based video delivery and two-way data exchange to transform the end-user experience. In these types of broadcasts, viewers are empowered to influence live content via participation. Although interactive video experiences don't always follow a choose-your-own-adventure model, they do always yield an increased level of control to users.

Low-latency video delivery is at the core of interactive streaming. After all, it's impossible to truly react to and influence something that's already happened. Low-latency streaming technologies permit in-the-moment response, thereby making the process seamless.

With a speedy streaming infrastructure solution in place, developers can build complex environments to enable dynamic participation. The result is an immersive, engaging experience characterized by both urgency and personalization.

Interactive Video Use Cases

Real-Time Entertainment and Second-Screen Experiences

Today, live entertainment is a two-way street. Even when it comes to traditional broadcasts such as sports, viewers now actively engage with the media. We all expect the freedom to review game-changing plays and up-to-the-minute stats — but next-generation interactive technologies take this several steps further.

Broadcasters are harnessing augmented reality (AR) to let fans dictate the camera angle and interact with virtual data overlays. Many of us also consume live events across multiple screens. Whether at the stadium or at home, our experience is supplemented by the jumbotron, our smartphones, or even "watch party" features within a streaming platform. These open up opportunities to supplement the live broadcast with real-time audio, video, and chat.

Because mobile apps, websites, and television screens compete for our attention, broadcasters have to engage viewers across all three. These multimedia and second-screen scenarios require low-latency video delivery to ensure a synced experience.

It's like we always say: Nobody wants to learn the final score on their Twitter feed while the live broadcast they're watching lags behind. As real-time entertainment becomes increasingly interactive, there's simply no room for latency.

Interactive Video Use Cases

Gaming and Esports

Speaking of games, timing is everything for gamers. Esports tournaments, live video game streaming platforms such as Twitch, and even mobile gaming apps such as HQ Trivia depend on lightning-fast stream delivery.

China boasts the largest gaming population globally, with north of 630 million participants. Unlike Twitch, Chinese streaming services such as Douyu and Huya rely entirely on interactivity as a means of monetization.

To reward their favorite gamers, fans purchase virtual gifts, which take the form of miniature icons that flutter on the screen. Everyone watching the live stream can see the exchange of virtual gifts take place, and the recipient often acknowledges the gift-giver during their personal broadcast. Because these virtual gifts are then redeemed for money, they're a vital source of revenue for both professional gamers and the platforms.

Developers continue to transform the gaming industry by adding new layers of interactivity to streaming environments. And whenever live video plays a role, doing so successfully starts with choosing the right streaming infrastructure.

Interactive Video Use Cases

Live Commerce and Auctions

The combination of live video and digital commerce promises to revolutionize consumer shopping habits. Already mainstream in the Asia-Pacific region, live stream shopping is booming in the U.S. due to COVID-19.

The model allows shoppers to engage with sellers via live chat, examine a product from multiple angles, and even leverage AR for deeper immersion.

Live commerce also helps drive more sales at higher prices. Why? Because real-time interactivity, community participation, and the closest possible experience to "being there" all create an auction-like atmosphere that engages customers.

Whether used to auction cattle, demo makeup, or forge direct-to-consumer channels for rural farmers, shoppable video is changing the industry. And because money is on the line during these interactive video experiences, maintaining synchronized latency across devices is a must.

Interactive Video Use Cases

User-Generated Content and Social Media

Since the start of the pandemic, content consumption on social media has surged — with 48% of consumers spending more time on platforms such as YouTube, Facebook, Instagram, and TikTok.

Video streaming on social media started off as a rather passive experience, with one-way broadcasts and limited interactivity to blame. But today, services such as Facebook Live support two-way interactions with reduced latency — as well as video chats through Facebook Messenger.

When it comes to user-generated content, viewers also play the role of creators. Even TikTok now offers a live streaming feature, which is being leveraged for everything from digital fashion shows to interactive music experiences.

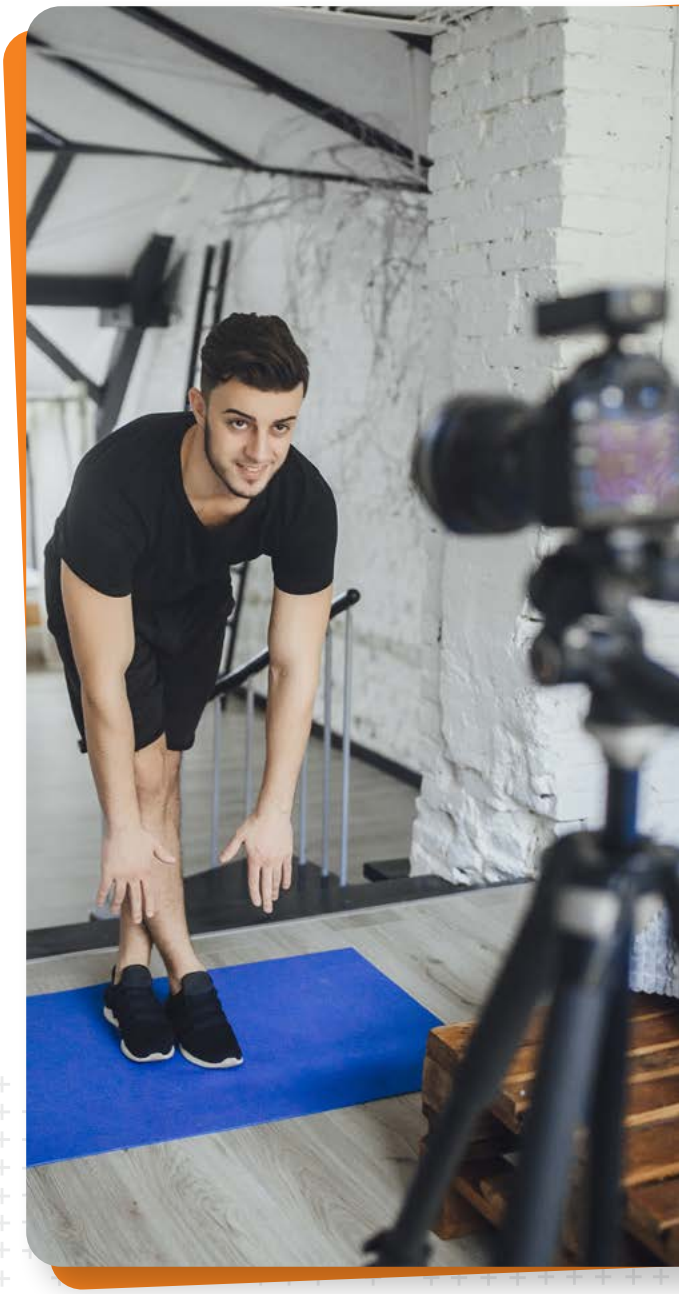
Interactive Video Use Cases

Interactive Fitness

From Peloton Interactive to local Pilates classes streamed over Zoom, digital interactive fitness describes the infusion of technology into the exercise industry. Live video streaming has proven particularly useful in this space — yielding cost savings and convenience for users.

Just as group fitness environments have been shown to increase motivation, there's strength in numbers when it comes to live streaming fitness. Interactive features can include instructors cheering you on, healthy competition between participants, and data related to pace, heart rate, or mileage.

The ability to incorporate this health, video, and audio feedback into an ongoing experience is what's contributed to Peloton's success. And copycats across the fitness industry are now racing to catch up.



Interactive Video Use Cases

Internet of Things (IoT) and Video-Enabled Devices

IoT video streaming dominates the market. Yet, we often take for granted how interactive these applications can be. Coastguards use drones for search-and-rescue missions, whereas military-grade bodycams help connect frontline responders with their commander. Any lag could mean the difference between life and death for these applications, making real-time video critical.

IoT streaming is also well entrenched in the consumer world — powering everything from pet and baby monitors to wearable devices and smart refrigerators. Just take Nest's word for it: "For everything you need, there's a Nest Cam."

Many of these video-enabled devices let viewers play an active role. Whether communicating with the delivery person via a doorbell cam or giving the dog treats via a dog camera, interactivity reigns supreme.

Interactive Video Use Cases

Gambling and Betting

Although hopping on a plane to Las Vegas may pose some logistical challenges, live streaming makes it possible to gamble from anywhere. From sports betting to casino games, the virtual gambling world lets global viewers in on the action.

To ensure legal online wagering, these streams must prioritize low-latency delivery. Fractions of seconds can mean billions of dollars when it comes to a high-stakes poker game.

The ability to deliver these streams to any device also ensures that participants aren't tethered to their couches during a live event. In the case of a controversial postrace disqualification, like the one we saw at the 2019 Kentucky Derby, this flexibility keeps remote participants in the game even after the main event.

Interactive Video Use Cases

Anything and Everything

Interactive streaming technology is anyone's for the taking. Virtual doctor visits, drive-through banking, and other forms of customer support now use interactive video technology to better engage customers and extend the physical reach of their employees. Real-time streaming has also shown promise in corporate settings for employee training and education. The potential for interactivity knows no limits.

Whatever the use case, minimizing latency is a must. And Wowza's interactive live streaming solutions answer this need by enabling several critical technologies.

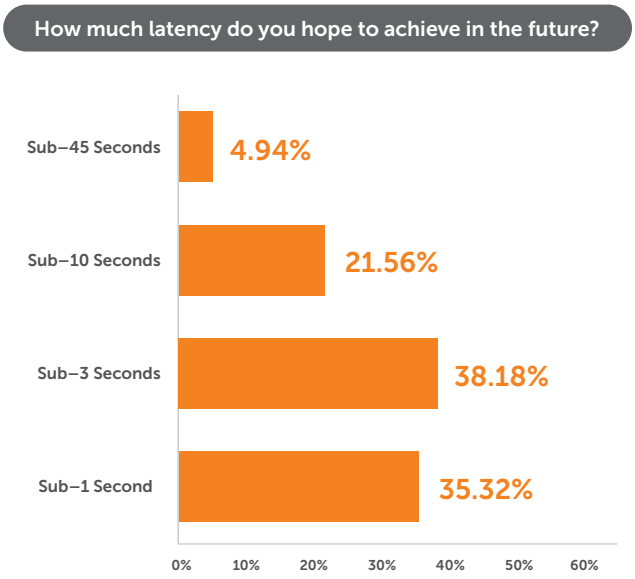
Critical Capabilities

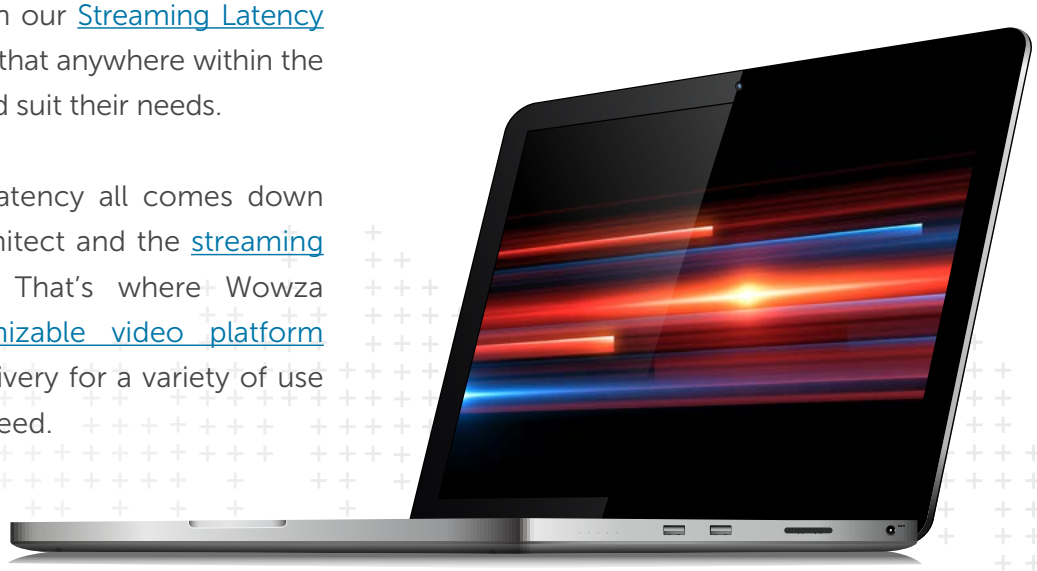
Low Latency

For developers looking to integrate live video into interactive solutions, sub-five-second latency is crucial. It may even be wise to aim for sub-second latency when supporting near-real-time exchanges such as video conferencing and medical cameras.

That said, although "near real-time" sounds like a good thing for anyone to strive for, we'd recommend being open to some lag when your use case allows. Why? Because configuring streams for speedy delivery can add additional complexity that's not always necessary. A couple of seconds in latency is acceptable for most broadcasts, and it'll allow for a smoother, more reliable stream. In fact, the majority of respondents in our Streaming Latency Report last year indicated that anywhere within the three-second range would suit their needs.

Achieving your desired latency all comes down to the workflow you architect and the streaming protocols you employ. That's where Wowza comes in. Our customizable video platform powers reliable video delivery for a variety of use cases with unmatched speed.

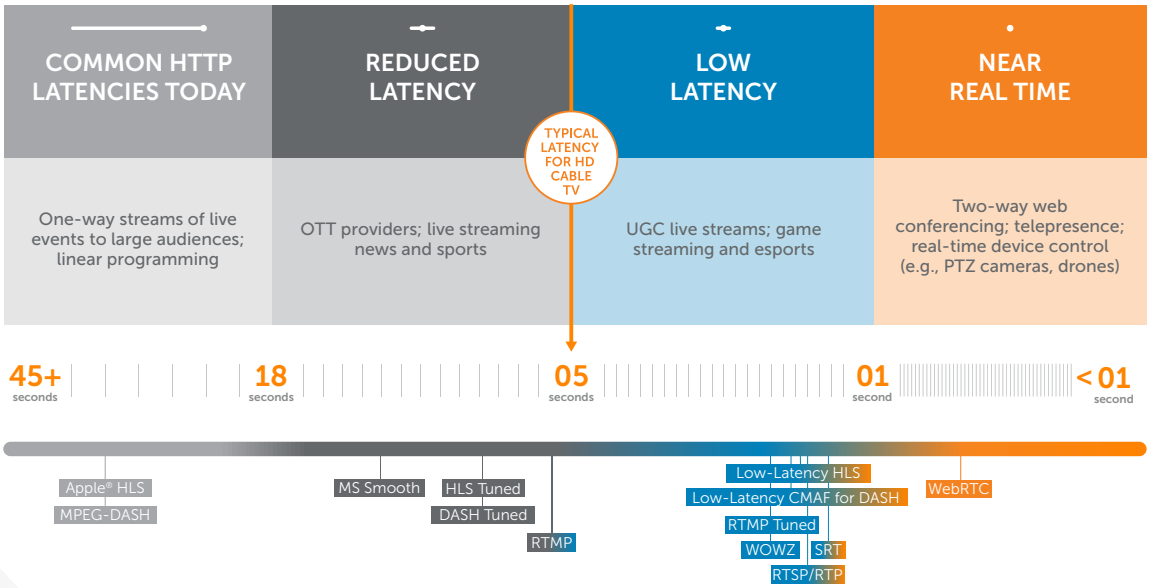




Critical Capabilities

Scalability

Most interactive use cases also aim to deliver a shared experience to multiple users. In such scenarios, the ability to reach numerous users across varying devices becomes a priority, and finding a scalable format is key.



You'll notice in the chart above that two of the most common protocols, HLS and DASH, come with a hefty amount of latency. That's because the two technologies sacrifice speed for smooth playback at scale. This is achieved via mechanisms such as buffering and adaptive bitrate streaming — both of which improve the viewing experience by increasing latency. On the flip side, pure WebRTC applications offer sub-500-millisecond latency, but viewer size is limited without a streaming platform like Wowza.

Hybrid workflows show promise in delivering the best of both worlds, as well as emerging low-latency HTTP-based technologies such as Low-Latency HLS and Low-Latency CMAF for DASH. Content delivery networks (CDN) also come into play.

Again, your best bet for interactive streaming at scale is to configure the right workflow for your use case using proven streaming technology.

Critical Capabilities

Two-Way Engagement

Rather than "breaking the fourth wall," interactive video experiences presume that there are no walls to begin with. So, keeping the conversation going requires a continuous feedback loop between the content and the end users.

Adding these interactive overlays often involves synchronizing timed metadata, chat functionality, polling, and two-way live video. This integration is key to luring in users.

Third-party tools and custom development are both required to implement these two-way engagement capabilities, which can then be deployed on Wowza's low-latency infrastructure. Professional engineering services also come in handy when developing such complex environments, allowing broadcasters to outsource architecture design and code development.

Low-Latency Streaming Protocols

RTMP

The Real-Time Messaging Protocol (RTMP) ensures efficient video contribution, but it's disappeared from the publishing end of most streaming workflows due to the impending death of Flash. Many content producers encode their low-latency video streams using RTMP, and then they repackage the stream into a more playback-friendly alternative once it reaches the media server.

RTSP

Another old-school technology for video contribution, the Real-Time Streaming Protocol (RTSP) facilitates low-latency streaming in many surveillance and closed circuit television (CCTV) architectures. As with RTMP, most workflows using RTSP will leverage a media server to ingest the stream and repackage it for delivery to viewing devices.

SRT

Secure Reliable Transport (SRT) is an open-source technology designed for reliable and low-latency streaming over unpredictable public networks. It competes directly with RTMP and RTSP as a first-mile solution, but it's still being adopted as encoders, decoders, and players add support. One interactive use case for which SRT proved instrumental was the 2020 virtual NFL draft. SRT ensures high-quality streaming and operational flexibility from anywhere with an internet connection.

WebRTC

As the speediest technology available, Web Real-Time Communication (WebRTC) delivers near-instantaneous voice and video streaming to and from any major browser. The framework was designed for pure chat-based applications, but it's now finding its way into more diverse use cases. Scalability remains a challenge with WebRTC, though, so you'll need to utilize a solution like Wowza Video or Wowza Streaming Engine to reach a larger audience.

Low-Latency Streaming Protocols

Low-Latency HLS

Low-Latency HLS (LL-HLS) is the latest and greatest technology when it comes to low-latency streaming. The proprietary protocol from Apple promises to deliver sub-three-second streams globally for playback on popular devices — while also offering backward compatibility to existing clients. Large-scale deployments of Low-Latency HLS require integration across the streaming ecosystem, so we've teamed up with Fastly and THEO to implement a seamless end-to-end solution.

Low-Latency CMAF for DASH

Low-latency CMAF for DASH is another emerging technology for speeding up HTTP-based video delivery. Although it's still in its infancy, the technology shows promise delivering superfast video at scale. That said, many vendors have prioritized support for Low-Latency HLS over that of low-latency CMAF for DASH.

Interactive Video Infrastructure

To architect a truly interactive environment, you'll need a low-latency streaming platform at the foundation. Any combination of the protocols listed above might be ideal for your workflow. But building the right experience requires a substantial digital infrastructure, with streaming media servers at the crux of it all.

For instance, if you're looking to convert an RTMP source stream for adaptive bitrate delivery using Low-Latency HLS, the incoming live feed will need to be transcoded and repackaged at the media server. These servers can be deployed on premises, in the cloud, or across a hybrid of the two — and today, broadcasters can leverage both streaming server software and cloud-based services to empower this technology.

Wowza's interactive video solutions allow developers to build custom workflows and integrate video into any product or service. Our full-service platform provides managed infrastructure for live video processing and delivery around the globe. Plus, our engineers stand ready to help you build a solution from the ground up.

> "Our goal always centered around enabling the next generation of live interactive experiences. Wowza's streaming capabilities are a key piece in creating a tech infrastructure to achieve just that."
>
> **Cedric J. Rodgers**
> Co-founder of Culture Genesis

Customer Snapshots

JTV

Jewelry Television (JTV) relies on Wowza for broadcasting live interactive content to customers on any screen or device. The luxury retailer developed an omnichannel e-commerce platform that speeds up conversion with live video. Interactive features help reduce the steps required between product discovery and purchase, while also increasing engagement. End users can interact with live broadcasts and make purchases with just a click of a button.

Carbyne

Providing a service that's critical in times of COVID-19 and beyond, Carbyne connects emergency call centers with video streaming. Each time someone in need makes an emergency call to a center leveraging Carbyne's platform, they are prompted to enable a live video stream with dynamic location and instant messaging functionality. Carbyne leverages Wowza's WebRTC capabilities to support sub-500-millisecond video delivery and then repackages the feed into the HLS protocol for broad distribution to paramedics, law enforcement officers, hospitals, and other stakeholders.

Child Health Imprints

Child Health Imprints (CHIL) is an IoT medical provider that powers low-latency streaming for remote monitoring of babies in the neonatal intensive care unit (NICU). The cloud-hosted iNICU appliance enables doctors to monitor neonates on life support around the world by streaming low-latency video with Wowza Streaming Engine. Child Health Imprints enlisted the help of Wowza Professional Services to synchronize video, clinical, and vital data for early diagnoses and quicker clinical intervention.

Conclusion

Whether you're looking to transform real-time entertainment or revolutionize the health care industry, interactive streaming starts with low-latency video delivery. And organizations across the world rely on Wowza for just that.

Our reliable infrastructure takes care of low-latency video delivery from encoding through distribution. That way, you're able to focus on bringing your interactive experience to life.

Build the next big thing in interactive live streaming.

Start your free trial today

About Wowza

Wowza is the global leader in live video solutions. Our full-service platform powers reliable, secure, low-latency video delivery for companies worldwide. With more than a decade of experience working with 35,000+ organizations in industries ranging from media and entertainment to health care and surveillance, Wowza provides the performance and flexibility that today's businesses require.

We work with each customer to ensure their success in putting streaming to work for their business. Our promise is simple: If you can dream it, Wowza can stream it.