AWS and Partners Make Remote Broadcast Production a Reality for Customers
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INTRODUCTION

For decades, live productions for sports, news, and entertainment required content providers to make costly commitments to placing people and hardware resources on location at event sites as well as in master control centers. Coordinating, capturing, and preparing footage for production and distribution could take hundreds of traveling staff, thousands of hours, and millions of dollars of dedicated, inflexible hardware on site and in the studio.

As audiences enjoy greater choice and demand more from live entertainment, broadcasters and OTT providers are finding that the hardwired approach to live production cannot provide the flexibility, scalability, or cost efficiencies needed to keep pace with growing demand and shifting tastes of consumers. Cloud-based content production has long been viewed as the alternative for media organizations that require greater flexibility, agility, and scale for their video operations; however, high-value live productions have been slow to make the transition to the cloud. Many organizations point to a lack of sophisticated cloud-based tools for the most critical workloads of live production, such as master control, editing, and switching.

Now, a large and growing ecosystem of tools, built by Amazon Web Services (AWS) partners, allows customers to untether live production from physical hardware and on-site locations and move their most critical production workloads into the AWS Cloud. Moreover, this shift has opened up the opportunity for media organizations to manage entire productions remotely for broadcast and OTT distribution.

In this paper, we explore the capabilities afforded by cloud-based live production solutions built on AWS, using Grass Valley’s Agile Media Processing Platform (GV AMPP) as an example. In addition, we review how Amazon Web Services offers a comprehensive foundation for remote and cloud-based live production.

GRASS VALLEY AGILE MEDIA PROCESSING PLATFORM

Companies that comprise the AWS Partner Network (APN) have listened to the needs of broadcasters and OTT providers and developed an array of tools that bring live event and remote production into the cloud. Solutions from companies including Grabyo, Grass Valley, Teradici, vMix, and more are used in production today, giving content producers the ability to deploy complete, end-to-end live video production workflows in the AWS Cloud, virtualizing workloads that previously relied on costly remote production trucks and centralized studio facilities.

To explain the capabilities of today’s cloud-based live production solutions, let’s explore the recently released Grass Valley Agile Media Processing Platform (GV AMPP).

GV AMPP is a cloud-based SaaS platform for broadcast that leverages the elastic compute resources of the cloud. Using just a browser on a laptop or desktop computer, the solution gives customers the flexibility to spin up or spin down applications as needed and only pay for the services they use. GV AMPP provides purpose-built interfaces for every operator function, even as these functions are fully distributed.

Running on top of AWS services, GV AMPP virtualizes all necessary functions for live production and master control. This gives media organizations the flexibility to transform their approach to live content
production. For example, in March 2020, two leading esports leagues that were early adopters of GV AMPP were able to transition quickly from studio-based and on-site live production to distributed remote production as a global pandemic sent players and production teams home. Following the transition to remote production, live events are managed without any physical switchers or audio consoles; the only physical hardware in the workflow are operators’ computers, cameras, microphones, and a comms panel.

The esports leagues that deploy GV AMPP previously managed live production locally, using trucks, and the program feed for each location was sent to the cloud for switching and regionalization using GV AMPP Master Control. In the new distributed remote production model, all feeds are sent straight to the cloud where production is performed for every match.

With the GV AMPP Master Control application, customers can create configurable virtual master control rooms accessible via web-based interface from anywhere in the world. Rather than paying a fixed price for a full-featured solution, sacrificing features due to cost constraints, or incurring the depreciation costs that come with a hardware purchase, GV AMPP lets customers match their costs with the size and complexity of their event. The system measures usage and each tool—switcher, audio mixer, multiviewer, clip player—has a different metered rate associated with it, so the user is charged only for the features activated and the amount of time each feature is used. When an event is over, the user can save their configuration so that can easily spin it up before the next event without spending time and money on set up.

GV AMPP allows multiple distribution streams with separate graphics and languages for each audience region to be produced by a single operator. For example, GV AMPP esports customers broadcast in four languages simultaneously: English, French, Korean, and Chinese. Monitoring and local program-distribution processes take place completely in the cloud, and the system connects easily with Amazon CloudFront and other content delivery networks.

GV AMPP is designed on AWS to provide the high security and reliability broadcasters and OTT providers demand. It requires authentication, uses private subnets, and uses Elastic Load Balancing to automatically distribute application traffic. In a typical deployment, the orchestration layer of the system runs across three AWS Availability Zones. The system ties into native AWS services such as Amazon Elasticsearch Service (Amazon ES) and Amazon ElastiCache. Other services such as database, messaging, and networking automation are deployed via Amazon Elastic Kubernetes Service (Amazon EKS) to Amazon Elastic Compute Cloud (Amazon EC2) instances.

For its data plane, Grass Valley uses Amazon EC2 G3 instances. Customers deploy GV AMPP apps via the GV AMPP resource manager on these instances to perform the video and audio processing required for live broadcast production. These instances provide substantial CPU and GPU cores to handle intensive real-time video processing. For example, customers can typically run up to eight decodes of 1080p H.264 at 59.94 frames per second while encoding multiple outputs, depending on system configuration. This also includes the capacity to support multiviewing, two players for clip playback, multiple graphics renderers, low-latency web monitoring, and video egress, all on a single instance.
A COMPREHENSIVE FOUNDATION FOR REMOTE PRODUCTION

With a community of technology vendors deploying live and remote production solutions on AWS, it is worth examining what makes AWS especially well-suited to these mission-critical video workflows.

**Comprehensive offering for media workloads** – AWS provides media customers with a full array of offerings designed for video use cases. From content creation through processing and distribution, AWS delivers a comprehensive set of purpose-built services and solutions for media customers alongside a vast selection of dedicated partner solutions. With AWS, customers can create an agile media infrastructure from media-specific components, tailored to their content and their customer engagement strategies. AWS services for video extend beyond the core video pipeline to include a host of tools for enhancing and monetizing content, such as machine learning and content personalization services that integrate readily with AWS video processing and delivery technologies.

**Broadcast-grade capabilities** – As interest in broadcast-in-the-cloud surges, customers are turning to AWS and its partners to enable live events, linear playout, and affiliate distribution on AWS infrastructure. Using statistical multiplexing (statmux) with the AWS Elemental MediaLive video processing service, broadcasters can achieve the video latency, video quality, quality of service, and reliability their affiliates and audiences expect. At the same time, they can reduce infrastructure and management expense and gain flexibility to experiment with new business models and make changes quickly, at low cost, and at low risk.

**Distributed global infrastructure** – AWS global infrastructure puts storage, compute, database, and network resources closer to customers to help their applications and workflows run faster. For consumers, this means lower latency and better performance for live video and interactive services. For broadcasters and OTT service providers, this means their teams’ virtual desktop infrastructures, editing suites, master control centers, switchers, and more can operate on infrastructure closer to the user, wherever they are working, to increase responsiveness and reduce latency for their remote applications.

**Flexible, resilient foundation** – AWS services offer high availability for media applications. From content ingest to content distribution, AWS solutions for media are engineered for stability, even when faced with unpredictable workloads. AWS Cloud computing resources are housed in highly available data center facilities. To provide additional scalability and reliability, these facilities are located in different physical locations, categorized by regions and Availability Zones. AWS Regions are large and widely dispersed into separate geographic locations. Availability Zones are distinct locations within an AWS Region that are engineered to be isolated from failures in other Availability Zones. They provide inexpensive, low-latency network connectivity to other Availability Zones in the same AWS Region. Users can optimize their infrastructure to the level of resiliency that best meets their needs, distributing resources across two or more AWS Availability Zones positioned around the world.
SUMMARY

As audiences crave more live content on more devices, broadcasters and OTT service providers must find new ways to scale up the volume of content they produce while managing costs in a highly competitive marketplace. With traditional, hardwired models of live content production lacking the flexibility or cost efficiency to meet this evolving reality, media organizations are turning to the cloud for innovative solutions.

AWS and its APN partners meet the need for cloud-based production with a comprehensive set of solutions that put broadcast-grade live production within reach. These solutions allow customers to reap the gains afforded by shifting production investments away from on-location equipment and studio facilities and toward fully remote production environments.

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