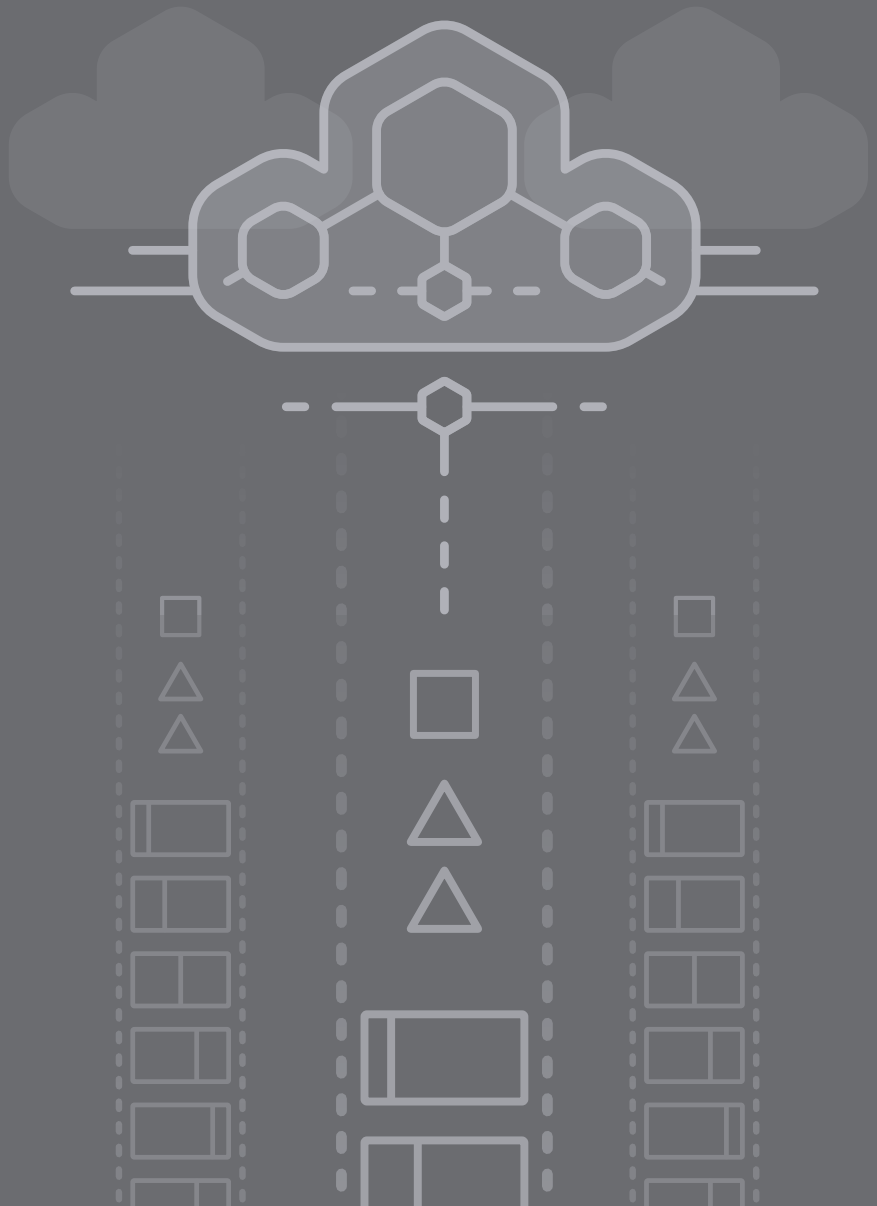
E-book

Video Processing and Delivery Moves to the Cloud

Making broadcast-grade video services simple, accessible and affordable



CONTENTS

01 | The Changing Roles of Video Providers 03

02 | A Shifting Video Landscape 05

03 | Where Conventional Video Technologies Fall Short 07

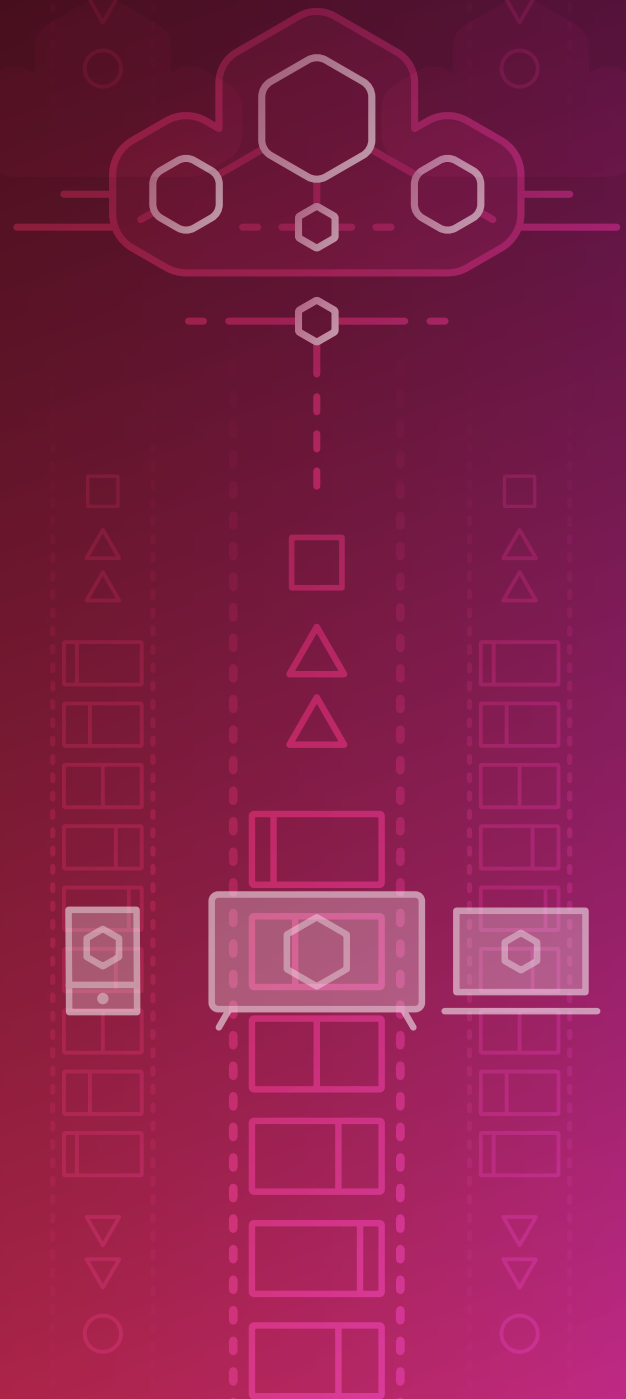
04 | Early Attempts at Cloud-based Video Infrastructure 11

05 | The Benefits of Moving Video Operations to the Cloud 14

06 | Unlocking Video Processing and Delivery in the Cloud 18

07 | Making the Move to Cloud-based Video Services 21

01 The Changing Roles of Video Providers



The Changing Roles of Video Providers

The quality, accessibility and utility of video is skyrocketing. With it, the number of organizations for which video is a vital part of daily operations is growing rapidly.

Do you create and deliver video content at scale, whether your audience is a handful of viewers or potentially hundreds, or even millions? Do you capture updates from company leadership and stream them live to remote employees, or record them for later viewing? Are you part of an enterprise that hosts or contributes to e-learning, such as through sales training, marketing webinars or compliance training? Do you provide services to users to help them find and reach an audience for their own video content? If so, then you are a video provider, and the shifting video landscape has significant implications for the way you create and deliver professional-grade video services.

> **Does your organization deliver video at scale? Do you stream live or recorded updates from company leadership? Are you part of an enterprise that provides e-learning assets? If so, the shifting video landscape will change the way you create and deliver video.**

In this e-book, you will learn:

- Why a growing number of companies are now in the business of providing professional-grade video to audiences
- How video providers are adapting to the changing video landscape
- What the evolution of video means to every video provider
- The strengths and shortcomings of conventional approaches to delivering video
- Why video providers can no longer look to traditional video solutions for a strategic advantage
- Which critical video processing and delivery functions can now be deployed as cloud services

02 A Shifting Video Landscape

A Shifting Video Landscape

Video is deeply embedded in today's connected experience. It's packaged for access on the go, it's ever-present in social media feeds and it's at the ready throughout the home, on connected TVs, set-top boxes, and a growing number of devices. At the office, video is a click away on the desktop, in the meeting room, in the training room or in the conference center.

As video has become more and more prevalent, viewers' expectations around its accessibility, quality and relevance have increased. Audiences now expect to watch the content they want, when they want, on the device they choose, with the best possible picture quality. Furthermore, viewers increasingly anticipate that the content they engage with will be appropriately tailored to their particular needs, interests or tastes.

Video professionals across the media and entertainment industry as well as in government agencies, educational institutions, corporations and nonprofits have worked hard to meet the demands of their audiences with respect to choice, quality and relevance. In doing so, they have begun to exceed the capabilities of the technologies currently used to process, prepare and deliver video to viewers at scale.

03 Where Conventional Video Technologies Fall Short

Where Conventional Video Technologies Fall Short

In today's video landscape, all video providers, from the largest global conglomerate to the fledging enterprise, face the same challenges. Simply put, traditional approaches to video processing and delivery cannot keep pace with the changing nature of video consumption and the rising expectations that follow from it.

The process of transmitting finished video assets from the source to various viewing audiences is generally the same one that has been used for decades. Using hardware-based technologies, typically in a data center information architecture, dedicated appliances are deployed to process and package video at separate stages that comprise a video workflow. These appliances often use application-specific integrated circuits, or ASICs, which are specialized to each stage in the workflow. They do the work of parsing video into discrete segments for compression and transmission over networks, packaging those segments for delivery as live content or as video-on-demand assets, and serving that content over networks via open channels or in response to requests from TVs, set-top boxes, computers, mobile phones or other connected devices.

Dedicated video hardware provides performance and functionality that is finely tuned to very specific requirements and can boast powerful features that address the needs of broadcasters and other video professionals. However, video workflows built on specialized hardware present a number of shortcomings in addressing the needs of video providers today:

They are capital intensive:

Building out physical infrastructure can entail millions of dollars in up-front purchasing costs. Those costs can double when you factor in the need for redundant infrastructure to support high availability strategies. As the useful lifespan of video processing and delivery hardware shortens with the increased pace of innovation, the time between compulsory updates of equipment shrinks, adding more cost.

They require complex resource planning:

Predicting the capacity a video workflow must support is more challenging than ever. If the equipment provisioned is insufficient to handle peak processing or unable to scale with audience viewership, this can lead to service failures that result in blank screens and frustrated users. If infrastructure is overprovisioned, money that could have been spent elsewhere is needlessly tied up in depreciating assets.

They require continuous upgrades:

As video production standards move from HD to 4K UHD resolutions and beyond, the amount of data a video workflow must handle can grow exponentially, requiring ongoing investment in database licenses, processing power and storage hardware in order to manage media assets.

They require significant operational expense:

Owning video infrastructure in a data center means ongoing management and maintenance. This can leave highly trained video professionals dedicating their time to software updates and patches, filing support tickets with vendors, and other administrative tasks that distract from their core focus. Alternatively, video providers may choose to employ or contract with IT professionals to do the heavy lifting of data center management; in either case, the cost of operating a complex video infrastructure can add significantly to the total cost of ownership (TCO) of traditional video processing architecture.

They are slow to address new and emerging standards:

The ever-increasing number of end-user devices coupled with the accelerating pace of change in video requires workflows to support a growing roster of standards and protocols in order to deliver the best viewing experiences to the broadest number of viewers. For example, proven video standards such as H.264/MPEG-4 AVC, and HTTP Live Streaming (HLS) have been joined by HEVC (also known as H.265), HTTP Dynamic Streaming (HDS), and MPEG-DASH. Emerging standards such as fMP4 in HLS, CMAF and IMF have significant industry support that will impact millions of viewing devices around the world. Keeping your video services current with new standards can mean significant upgrades to hardware-based video workflows, and may even trigger a complete refresh of the data center infrastructure.

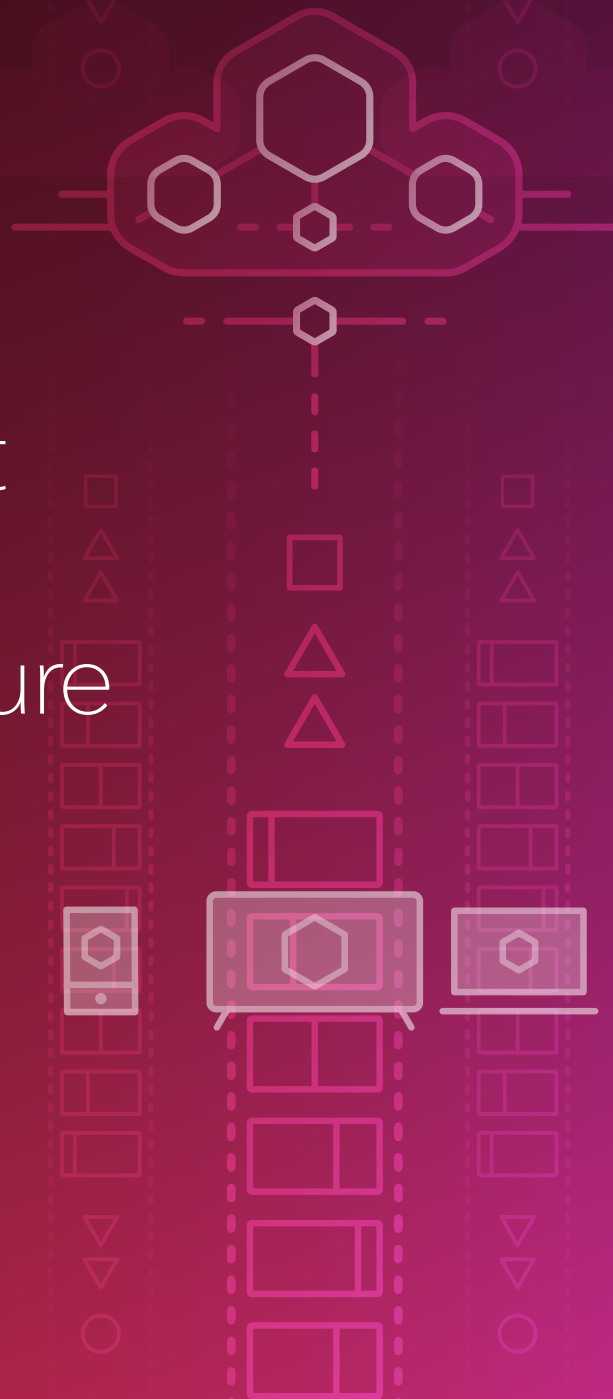
About Undifferentiated Heavy Lifting

In his visionary 2003 Harvard Business Review paper, "IT Doesn't Matter ," Nicholas G. Carr was one of the first to argue that information technology had become so ubiquitous as the foundation of modern business that it no longer afforded any organization a competitive advantage. Carr draws comparisons to the telephone, electric generator and internal combustion engine as technologies that once, by their very availability to an enterprise, could provide a strategic advantage but became universal commodities that add no unique value.

The argument that naturally follows from this point of view is that organizations should invest as few resources as possible in those things that don't provide differentiation or strategic advantage.

Amazon Web Services first coined the term "undifferentiated heavy lifting" to describe the work that organizations do to plan, purchase and maintain their IT infrastructure. As video processing and delivery technologies have come to mirror IT infrastructure, the same argument about prioritizing organizational resources now applies to video infrastructure. If the time and expense devoted to sourcing, buying and administering video infrastructure does not distinguish or add value to your content or for your viewers, it is safe to assume those resources could be better spent elsewhere.

04 Early Attempts at Cloud-based Video Infrastructure



Early Attempts at Cloud-based Video Infrastructure

In an effort to overcome the shortcomings of traditional video infrastructure and to lessen undifferentiated heavy lifting, technology vendors have begun to offer cloud-based services that promise to reduce the role of hardware-based solutions in the video workflow.

These approaches fall into two categories: video processing and delivery software ported from hardware solutions to storage and compute resources hosted in the cloud, and cloud-based, all-in-one solutions dedicated to handling the entire video processing and delivery chain.

These approaches offer certain advantages that come with the move to a cloud-based framework. However, each also has disadvantages video providers should take into account when considering the cloud for their video workflows.

Deploying hardware-based solutions as cloud-hosted software can significantly reduce the capital expense associated with buying or upgrading video components, and can also reduce management burden. This approach can bring the powerful capabilities of hardware-based solutions into the cloud, offering broadcast-grade capabilities at a pay-as-you-go price. However, these solutions typically require the same costly custom integration work as conventional hardware solutions to make them work effectively with other components of the workflow and lack flexibility to adapt to changing business requirements. Like hardware solutions, they still require hands-on monitoring and management from skilled professionals.

By comparison, all-in-one solutions promise a complete, end-to-end video workflow hosted in the cloud. With this approach, users can shed a great deal of the capital and operating expense associated with video processing and delivery. However, such platforms generally use a one-size-fits-all approach that may not work for many video providers. Often, every aspect of the workflow, from ingest to encoding, digital rights management to packaging, and content delivery network (CDN) to video player, are proprietary solutions developed by that same vendor, who may not have a core competency in each element of a comprehensive video workflow. Customers use only the vendor's components, so sourcing best-of-breed technology for specific parts of the workflow is not an option. These solutions are often designed around a narrow set of use cases that work well for certain requirements and less so for others, and the ability to control or tune the platform to a provider's unique needs is limited. This approach often does not include broadcast-grade features or the latest codecs, which leads to inefficiencies and limits video providers in their ability to deliver the viewing experiences their audiences have come to expect.

Ultimately, as with hardware-based solutions ported to the cloud, all-in-one solutions represent a set of compromises that take some advantage of cloud-based infrastructure but fall short of delivering the full capabilities of conventional infrastructure with the benefits of a cloud-based architecture.

05 The Benefits of Moving Video Operations to the Cloud

The Benefits of Moving Video Operations to the Cloud

Video providers who choose to migrate all or a portion of their streaming video infrastructure to a cloud-based architecture can tap into a number of opportunities to improve the performance, efficiency and costs of their video workflows. In considering the cloud for video processing and delivery, evaluate whether available offerings will deliver on these benefits, and how those benefits are measured by your cloud provider.

Ease of use

Cloud-based video solutions offer video providers simple, console-based user interfaces and the sort of "set it and forget it" functionality that hardware systems cannot match. Users can launch many services with a single click, while the cloud architecture does the work to set up and maintain the service automatically.

Broadcast-grade capabilities

Cloud-based video processing and delivery offers video providers access to a full range of codecs, features and integrations that enable broadcast-quality video services at a cost that makes these accessible to virtually all types of providers.

Pay-as-you-go utility

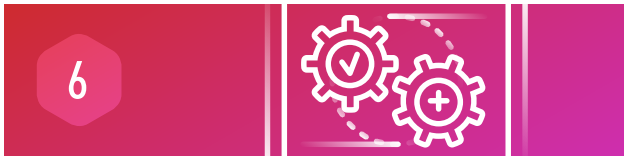
Most cloud providers will bill for their services on a pay-as-you-go basis, with no up-front costs and no investments in unneeded capacity or overprovisioned systems.

Automated, limitless scalability

Cloud services can scale resources up or down automatically in line with demand, eliminating time spent provisioning resources and avoiding the cost of acquiring over provisioned infrastructure to address peak demand.

Flexible workflow options

Integrations between services from a cloud provider and services from third parties, such as DRM vendors, ad decision servers and CDNs, allow video providers to select best-of-breed solutions to meet their specific requirements at every step of the video workflow.



Built-in reliability

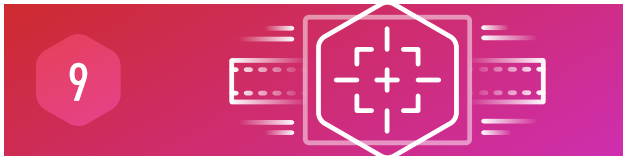
To support maximum uptime and availability, cloud-based video processing and delivery services may be deployed across redundant resources and/or in different geographic zones, with user-specified options to further enhance durability. Components are monitored for health and degraded components are automatically replaced without disrupting active workloads.

Operational agility

With the ability to conduct low-cost experiments and deploy new services within minutes, cloud-based video services help video providers quickly develop new offerings, adapt to changing audience interests or capitalize on new business opportunities.

New paths to monetization

Cloud-based video services are engineered for seamless integration with third-party ad decision servers and DRM providers to help enhance and protect the value of your content. Some also support server-side ad insertion, which allows video providers to deliver tailored advertising to viewers for increased audience engagement and better returns for advertising programs.



Focus on what matters

With cloud-based video services, video providers can set aside the undifferentiated heavy lifting of acquiring and maintaining video processing and delivery hardware, so you can focus personnel and financial resources on creating and delivering innovative video experiences and delighting viewers.

Stay future-ready

As new formats such as HDR video and 4K resolution reach the mainstream, cloud-based video services can help video providers stay out in front of their audiences without the need to upgrade or replace expensive technology. This extends to related capabilities, such as artificial intelligence and machine learning, that have begun to intersect with video processing and delivery.

06 Unlocking Video Processing and Delivery in the Cloud

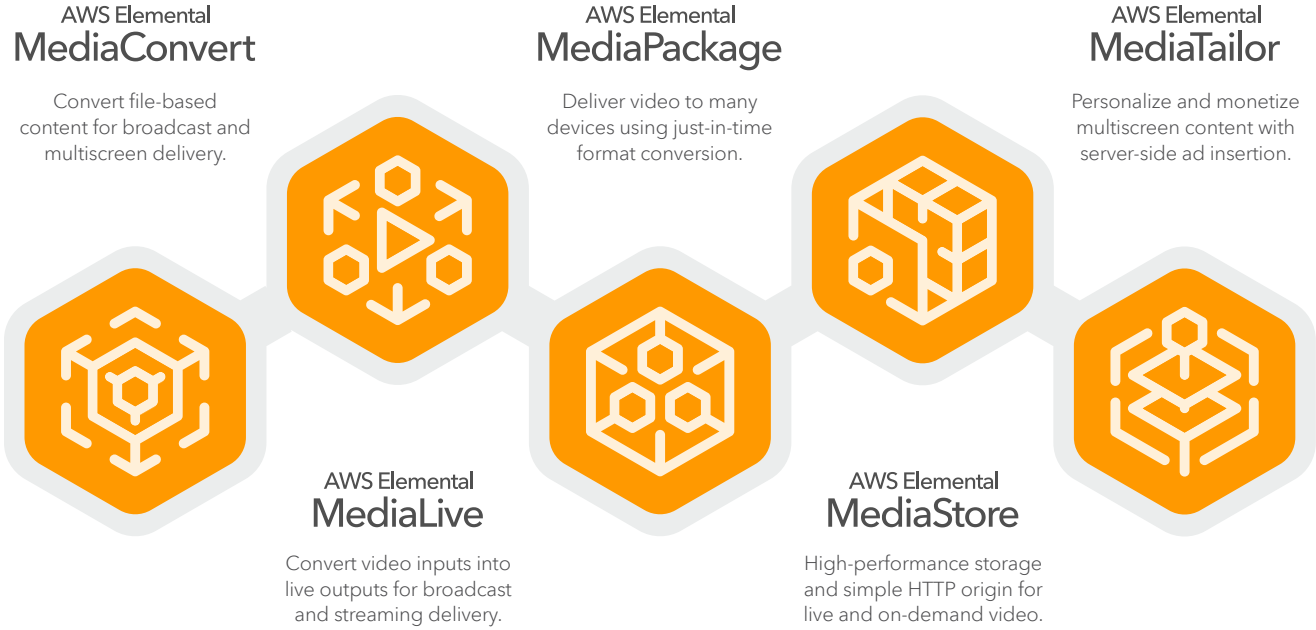
Unlocking Video Processing and Delivery in the Cloud

Over the last decade, many components of the video workflow have been deployed as broadcast-grade cloud services, with the exception of video processing and delivery.

As examples, content delivery networks are now available within the cloud from major vendors, promising reliable, high-bandwidth distribution of video over the internet to users anywhere in the world. Cloud-based data storage offers video providers virtually infinite capacity for their media assets. Likewise, high-performance compute resources are available on-tap from a number of cloud providers, offering software-savvy users the ability to perform processor-intensive tasks without having to spend on hardware.

While many video providers are benefitting from these services today, until recently, video providers have not been able to realize the full benefits of cloud-based solutions across their entire video workflow, including the critical components that prepare, package and deliver high-quality video for broadcast and streaming to connected devices.

Now, video providers can use cloud-based services for file-based transcoding, live video encoding, video origination and packaging, media-optimized storage, and content personalization and monetization. Services can be deployed as discrete components or as the building blocks for end-to-end video workflows, and offer built-in integration with other cloud services like those mentioned above. The following services are examples of what is now available to video providers from Amazon Web Services.



aws | aws elemental

07 Making the Move to Cloud-based Video Services

Making the Move to Cloud-based Video Services

Empowered with increasingly capable devices and faster networks, viewers are ready to offer their attention and engagement to video providers who serve them best.

As the models of video consumption continue to shift, conventional approaches to video processing and delivery become more and more challenging to use and maintain, add significant capital expense and struggle to keep pace with evolving industry standards.

With the advent of cloud-based video processing and delivery, video providers can now deliver reliable, broadcast-grade video services with the flexibility and ease of use of a cloud service, while only paying for what they use. For those considering migration to cloud-based services, AWS Elemental has published a **Practical Guide to AWS Media Services** with real-world guidance to help you move away from costly infrastructure investments and toward simple, pay-as-you-go services that let you focus your resources where they can make the greatest impact.

About AWS Elemental

AWS Elemental, an Amazon Web Services company, combines deep video expertise with the power of the AWS cloud. Solutions from AWS Elemental allow broadcast TV and multiscreen video to be customized, originated and monetized at global scale. Flexible, software-based video processing and delivery gives global media franchises, pay TV operators, content programmers, broadcasters, government agencies and enterprise customers the ability to deliver highly differentiated viewing experiences and the freedom to focus on what matters: transforming ideas into compelling content that captivates viewers.

[i] *"IT Doesn't Matter," Nicholas G. Carr. Harvard Business Review, May 2003*

aws | aws elemental

aws elemental

Perfecting the Media Experience

1320 SW Broadway, Suite 400
Portland, Oregon 97201
P 503.222.3212
F 503.914.0322
elemental.com