

Are You Ready for the Cloud?

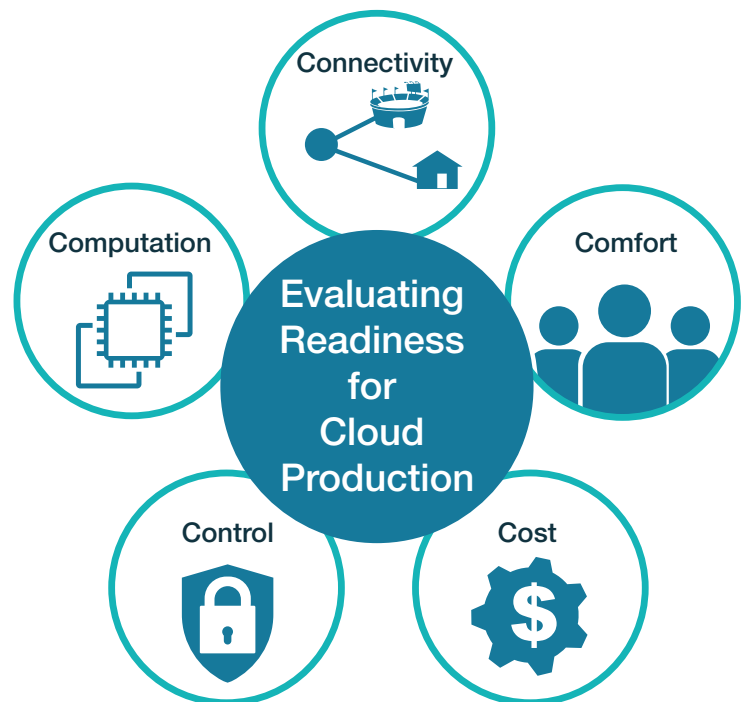
Considerations for Transitioning to Cloud-based Media Production

There are many benefits derived from adopting a cloud-based solution for new media production, including virtually infinite resource scalability, global workflow distribution and access to unique data processing capabilities. If you are reading this technical brief, it's probably because you've identified some ways that a cloud-based solution could further your business strategy. If you are like most potential adopters of cloud technology, you are also wondering how might the cloud take you from where you are today to where you want to be.

That is an important question. Adopting a cloud-based media production workflow is not just a technology decision. It is a strategy that, when done well, can have enormous benefits across your organization in terms of cost reduction, employee engagement and productivity, and speed to market.

To fully capture those benefits, it is important to be ready for the transition to the cloud from both a technological and an organizational perspective. Here are five key areas to consider when designing your cloud production strategy:

- **Connectivity:** What is the underlying physical structure that ties together all of the resources involved in creating, storing and distributing content? Where does it make sense to locate processing?
- **Computation:** After receiving inputs to your cloud system fabric, how do you want to modify them before distributing them as finished assets? How much processing will your applications require?
- **Control:** How many people will access this system? Where can they be located? What type of applications can they access? Do you need role-based access control (RBAC)?
- **Comfort:** What skills sets will you need in your organization to manage the new platform? Are these individuals already part of your team?
- **Cost:** What financial models are available to you? How do you calculate the total cost of ownership? How do you maximize the return on your investment?



Pro Tip: Start small and learn. Don't try to do everything at once with your cloud strategy. As you gradually roll out services, you can see the benefits and get buy-in throughout your organization. Plus, starting cloud services step-by-step can help you react quickly to business needs.

Are You Ready for the Cloud?

Connectivity

In this step you are considering the actual “plumbing” of the network, how big the data paths are and where do they physically go before reaching a cloud data center. The questions below identify a variety of factors that can influence the overall network structure.

Where are the raw sources coming from? Include video, audio and graphics as well as metadata, closed captioning or anything else you need in the final content.

Where are finished assets going? Is it live- or file-based? Broadcast or on-demand? What are the various platforms that you want to have host your content? In the final design, your solution should reach as many of those host platforms as possible with as few steps as possible.

What connections are available between the source acquisition and the nearest data center? “Last mile” connections between the data center and the endpoints for source acquisition and content creation may have less bandwidth than you need. Geographic proximity to cloud data centers, the number of hops required to get there, and the maximum amount of bandwidth available at each hop are critical performance factors.

Will you need compression? Generally, when transporting video over the public internet, some compression standard will be required. Consider what

“house protocol” you want to adopt: NDI, SRT, WebRTC, RIST, Zixi? There are pros and cons to each format. Standardizing on a few will reduce the complexity of multiple format conversions.

What is the geographic footprint of your planned system? With data centers located across the globe, it is easy to locate processing close to where the content is acquired. Systems that allow for processing to be placed anywhere in the world give much more flexibility and allow management of latency.

When and how should you use a public, private and/or hybrid cloud service? In today’s cloud environments, this is typically a choice based on business conditions. Two key factors are economics and performance. If you expect to continuously use the system at full capacity, it is likely to be less expensive over the life of the project to own the data processing center rather than “rent it” in the cloud. As a simple matter of physics, an on-prem data center generally has lower total latency across the system. Organizations with existing equipment may find it beneficial to begin with a hybrid configuration. Greenfield projects typically capture the most benefit from hosting the entire solution in the public cloud. Even if data processing is done locally, providing orchestration in the cloud provides the greatest system flexibility.

Compression protocol comparison

	Latency	Security	Bit Rates Supported by GV AMPP (Grass Valley’s cloud-based unified production environment)	WAN Capable	Protection over Lossy Internet	Primary Use Cases	Alpha Channel Support
SRT		256-AES	Configurable: 1-100 Mb/s, typical 15-20 Mb/s for contribution	Yes	Yes, FEC	Contribution	No
WebRTC		Yes	~ 14 Mb/s	Yes	(Depends)	Low latency monitoring	No
RIST		Main profile, not basic	Configurable: 1-100 Mb/s, typical 15-20 Mb/s for contribution	Yes	Yes	Contribution	No
Zixi		Yes	Configurable: 1-100 Mb/s, typical 15-20 Mb/s for contribution	Yes	Yes, FEC	Contribution	No
AMPP Streaming		DTLS/SRTP	Configurable: 1-100 Mb/s, typical 15-20 Mb/s for contribution	Yes	Yes, RIST	Contribution	No
NDI	Lowest	No	Variable: upwards of 100 Mb/s for 1080i59.94	No	(Requires third-party help)	Production between cloud instances	Yes
RTMP		No	Typically less than 10 Mb/s	Yes	Yes, TCP	Legacy cloud streaming format	No
RTMPS		Yes	Typically less than 10 Mb/s	Yes	Yes, TCP	Legacy cloud streaming format	No

Pro Tip: Current pricing models make it relatively inexpensive to put data into the cloud. Once your content is in the cloud, however, it is best to keep the workflow in the cloud as long as possible. Limiting the amount of data transfer in and out of a cloud platform provides significant cost savings.

Are You Ready for the Cloud?

Computation

Map the workflow in terms of functionality. This is a brainstorming step. It includes not only what you have now, but what features you would like in the future.

What is the maximum compute resource that I need? This isn't a question you will be able to answer by yourself. Every application requires different amounts of compute. After you've determined the features you want, talk with your solution provider to find out how much compute resource you would need to reserve with your cloud service provider. Note that how a solution provider offers those features can vary greatly between providers. A monolithic cloud application will likely require the entire application to be running to perform a meaningful task. Well-designed SaaS applications based on microservices may require a much smaller amount of compute as only the features needed are spun up.

How many compute instances are required? The answer to this question has both strategic and financial implications. Fitting all the computation on a single node is typically less expensive. While computational nodes do have high rates of uptime, there is potential for failure with no back up if only using a single node. Just as in other technologies, using multiple nodes generally consumes more processing than a single node as streams are sent and potentially duplicated between nodes.

Contact a Friend

Walking through this preparation for the first time may seem like a big task. Grass Valley has experienced solution architects who have helped previous broadcast and media customers successfully make the transition to the cloud. We are happy to work with you to provide the best solution for your strategy. We offer practical assistance for the right size system today with ample room for expansion as your needs evolve.



Does vendor have a strategy for working across multiple compute nodes? Ask the prospective vendor about this strategy. It is important that the system makes operation across multiple nodes imperceptible to the end user.

System Evaluation

Consider your system according to each of the factors below. The more boxes checked, the more beneficial a cloud-based workflow will be.

- ✓ **Geographically dispersed.** With a much broader reach than most networks, cloud solutions make it easy to connect people and resources across multiple locations.
- ✓ **Experimentation.** Rapid spin up and down of cloud solutions enables rapid prototype and distribution of new content ideas.
- ✓ **Existing cloud services.** It is typically faster and cheaper to add new functionality in the cloud rather than as a terrestrial service.
- ✓ **Varying production schedules and requirements.** The elastic nature of cloud services make it much easier to adapt from one production to the next.

Pro Tip: Consider a unified production ecosystem, such as the Grass Valley Media Universe (GVMU), that brings the entire production chain onto a single platform with a common user experience and verified interoperability. Fragmentation among many specialty applications makes orchestration and governance of the total system quite difficult as interoperability between systems is limited. Open to alliance partners, GVMU offers a wide range of native and connected solutions from various manufacturers.

Are You Ready for the Cloud?

Control and Compliance

Getting people into the system — and keeping them out of places they shouldn't be — are important aspects of the overall design.

How many access points do you require for the system and where would those points be located? If operators work from home, do they have sufficient bandwidth to control and monitor solutions for their job? Does the control system allow monitoring from home or require a central location?

What strategies does your solution provider have to support your needs? What security measures are in place to prevent unauthorized access? The system should require unique identities for each user with access only to those parts of the system required for their responsibilities (RBAC). If using the public internet, how does the system work in a bandwidth constrained environment? How are a secure connection and signal encryption ensured?

What are the rules and regulations that your cloud providers need to adhere to, to keep your company safe and in compliance? There are no current broadcast/media industry standards for cloud security. However, there are best practices that may be adopted from the broad cloud user community.

Pro Tip: Make sure any solution provider conforms to the following best IT practices of a representational state transfer (REST) architecture:

- + All REST operations are executed over HTTPS for secure communication
- + All REST operations rely on JSON Web Tokens (JWT) for authorization
- + Authentication is handled through an Identity Service (optionally, delegate authentication to a third-party server such as Okta)
- + SRT streaming is secure and encrypted
- + Native AMPP streaming is encrypted using DTLS-SRTP
- + The solution provide regular conducts third-party penetration testing to validate security

Comfort in Usage

A good cloud-enabled production environment takes away the operator learning curve by making the transition to the cloud transparent to the production crew. Working in a cloud-enabled environment may seem scary to an operator who is used to seeing where every wire and card is connected, but it doesn't have to be.

Are you planning to use a proprietary cloud? This is a good time to enable a conversation between your IT department and your solution provider to establish requirements for an on-premises cloud and address whether it may be better to work with a third-party cloud provider.

Do you already have personnel available to implement the cloud solution that you choose? Not all cloud solutions are equal. It's important to understand from your prospective vendor the level of skills required in your organization to implement and support the preferred solution.

How much of the operator workflow will have to change? Do you want to use existing control surfaces? Is there a unified user experience regardless of the application being used? Keeping the operational side of things familiar while adopting new skills on the processing engine side makes an easier transition.

How simple is the system to troubleshoot? Your proposed system should have tools for visualizing the state of the system and monitoring for errors, as well as tools to respond quickly to any issues that may occur.

If I run into something I can't handle, what is support like? What channels of communication to customer support and engineering are available? What is a typical response time?

Pro Tip: Some content creators are trying to pull together integrated systems on their own. This can lead to a lot of technical frustration in the early days of deployment, especially if your organization doesn't have the requisite DevOps and IT skills. When you start with a unified production environment like GV AMPP, application user interfaces are all organized into common dashboards and controls. You are guaranteed that the system will work together, leaving you to focus on the non-technical issues of the transition. GV AMPP can help can help with the creatives as well. AMPP-connected solutions allow you to use familiar management tools and control surfaces that run on cloud-based engines.

Cost

The elastic nature of well-designed cloud applications make them easy to deploy and expand or modify with no large upfront infrastructure buildout before the system is operational. Note that as outlined below, there are many strategic variables that make a notable difference in the total cost of the content production. When estimating costs, it is important to take a total cost of ownership perspective. The most accurate comparison should be calculated on the basis of everything saved by implementing a cloud-based solution. This may include reducing building and infrastructure overhead, reusing existing control surfaces, optimizing employee time and eliminating travel and other personnel costs associated with outside production. There are a number of things to consider as you evaluate cost:

Is your cloud usage episodic or continuous? Usage costs vary depending on whether you are using the cloud for bursts of activity or 24/7 operations. Cloud providers offer different rates depending on usage.

What is your company's strategy for managing capital and operational expenses over time? Are you planning to shift more of your costs to an OPEX model? An OPEX model provides better cost matching for determining the actual ROI of a particular piece of content. If your company is accustomed to a CAPEX model, it would be beneficial to review with finance how an OPEX model will help your operation.

How will be usage be calculated? Are there tiers of pricing? Are there seat licenses charged per user? If you are paying for hourly usage is there a cap on the amount you will pay? What happens if your usage exceeds the cap? Because of the various options from vendors, explore pricing models to optimize your costs. For example, committing to a fixed amount of usage over a longer period of time typically results in lower hourly rates than periodic bursts of usage.

Is your preferred solution tied to a particular cloud service provider? Having a solution that can work across multiple cloud service providers is critical not only for convenient access, but also in today's environment of financial driven performance. You never know when finance will direct a change to your cloud hosting provider, moving to a new vendor because of a new contract in place. Flexibility in this area gives you additional freedom to manage costs.

Pro Tip: Many cloud providers have pricing calculators that help estimate the real costs you'll face after a cloud migration vs. your current costs. [AWS pricing calculator](#) and [Azure Pricing Calculator](#) are two options. There are also third-party service providers, including Grass Valley, who specialize in helping organizations transition to cloud that can provide customized TCO estimates.