

AMPP

Agile Media Processing Platform



The world's most agile production and distribution platform.

The *Agile Media Processing Platform* (AMPP®) from Grass Valley® is the live production and distribution platform that empowers today's media makers to create more content more efficiently, giving creators the additional resources, flexibility and technical edge necessary to thrive in a challenging live media future. AMPP's unique integration of hardware, software and cloud-native services provides the foundation for comprehensive suites of media production and distribution tools from ingest to playout, with the ability to quickly scale the system to whatever size is needed and to give secure access to team members

wherever they are. Producers can arrange for the best team and tech on a per-job basis, and quickly deploy custom workflows to suit each project.

Work anywhere. Play everywhere.

Purpose-built production suites are familiar. But they don't always match the need for agile, easily changed systems that can create the volume and diversity of content your business requires. That's why Grass Valley hardware, software and services are integrated into AMPP, bringing a seamless connection to new capabilities that are only available in edge-computing technology. With

AMPP you can choose to work in your studios, remotely, on premises, in cloud, with hardware, software or all the above. For details see the [AMPP Platform web page](#).

In the emerging model of dispersed production, creatives, crew and talent in multiple locations come together per event. AMPP supports every aspect of live production, from every point on the planet. With your "dream team" already working anywhere, crew travel and entertainment costs drop dramatically. And of course, cloud-based distribution means your show can play instantly everywhere.

Key Features

- Scalable to as many instances as required without upfront buildout
- Located on any combination of public and private cloud services
- Flexible, elastic I/O with access to any source on the AMPP fabric
- Cloud-hosted replay without sacrifice on responsiveness and accuracy
- Operator experience remains the same regardless of distance from the processing
- Operators may connect using typical residential internet
- Frame-accurate for live production
- Fully compatible with connected control surfaces and applications
- Intuitive software solutions



Match your business needs

Making it even simpler to track costs for each production, AMPP's platform management tools bring logging, user administration, task controls and a billing overview into a single, unified user interface. It has never been easier to quickly oversee all the costs associated with a specific production.

Spinning workflows up and down can be done in minutes. You no longer need to know in advance the size of the system needed for a particular production. It is easy to quickly expand a system in terms of both scale and functionality.

You can experiment with new concepts at little risk. Add another feature or workflow such as content localization or highlight packages to your existing production capability without a major upfront investment. Try out a potential solution and then rearrange as needed.

Open to invention

AMPP is an expansive, inclusive ecosystem with unlimited scope. As an open platform, AMPP gives users access to solutions from across the production chain — from ingest to playout — including solution options from a variety of vendors. Using AMPP APIs, third-party members of the

AMPP Alliance offer fully vetted solutions that can plug right in and join the party. Any imaginable workflow can be built without relying on a single vendor for the whole solution. For details, see the [AMPP Streaming SDK tech brief](#).

We love live

To attract and keep an audience, your content must look good. While it can work in most common formats, AMPP's internal 4:2:2 uncompressed 10-bit processing provides a signal quality that meets the demands of professional broadcasts on linear TV, including UHD HDR.

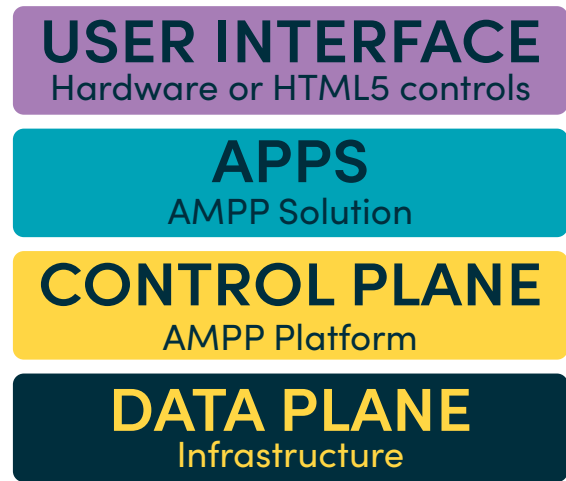
Designed to support live media production, AMPP provides precision signal timing and low latency. Operators can work on-prem or in the cloud with no noticeable difference in performance or system response times. The system also offers a range of resiliency architecture alternatives that maintain high availability — even if the cloud connection is temporarily lost.

There's a reason Grass Valley is a trusted name in television technology. For six decades we've been inventing tools that enhance creativity — and work reliably. Only Grass Valley offers the open, comprehensive, end-to-end approach to television's new, wide-open future. AMPP.

GV AMPP Architecture

AMPP is a microservices architecture that consists of a Grass Valley operated multi-tenant control plane, which is provided as SaaS, and a private customer video processing data plane that can either be in the cloud or on the ground. This enables extremely flexible workflows that have all the advantages of the cloud edge compute, while recognizing that for some use cases, hosting the entire system on-prem may better meet production requirements.

Modern technology stacks are sets of tools and technologies used to build and run an IT solution. As shown in the diagram, the technologies build on each other. Because the different layers of the AMPP technology stack can be run in different host environments, it can be helpful to consider the different these layers separately.



AMPP Technology Stack

The AMPP Data Plane

The real-time video processing happens on the AMPP data plane. The data plane infrastructure may run on-premise or on a public-cloud-hosted virtual machine and is private to an individual customer account.

AMPP makes efficient use of its processing resources by running many individual applications on a single compute node. These apps are stopped and started individually as needed. All apps within the system share access to a common set of 10-bit YUV uncompressed video flows that allow multiple apps to interact with the same frames of video without incurring any significant latency.

Within the same data plane, you can run many copies of the same app with their own specific configurations. These are called workloads and can be managed from a central application called the Resource Manager. The advantage of this approach is different productions can have their own workloads, which can be stopped and started as a block while preserving their individual show setups.

AMPP Grid

A single AMPP system may have multiple hardware or software compute nodes running under a single control plane. AMPP grid technology allows hardware nodes to scale with a high-speed interconnection that keeps the system unified.

Edge Computing

Because today's production systems may be spread over a wide geographic area, AMPP supports edge computing. In this configuration, processing devices may be placed close to where the audio or video is being generated. Processing the video locally, regardless of where that production is being controlled, ensures that no signal transit time delay is seen by the local audience.

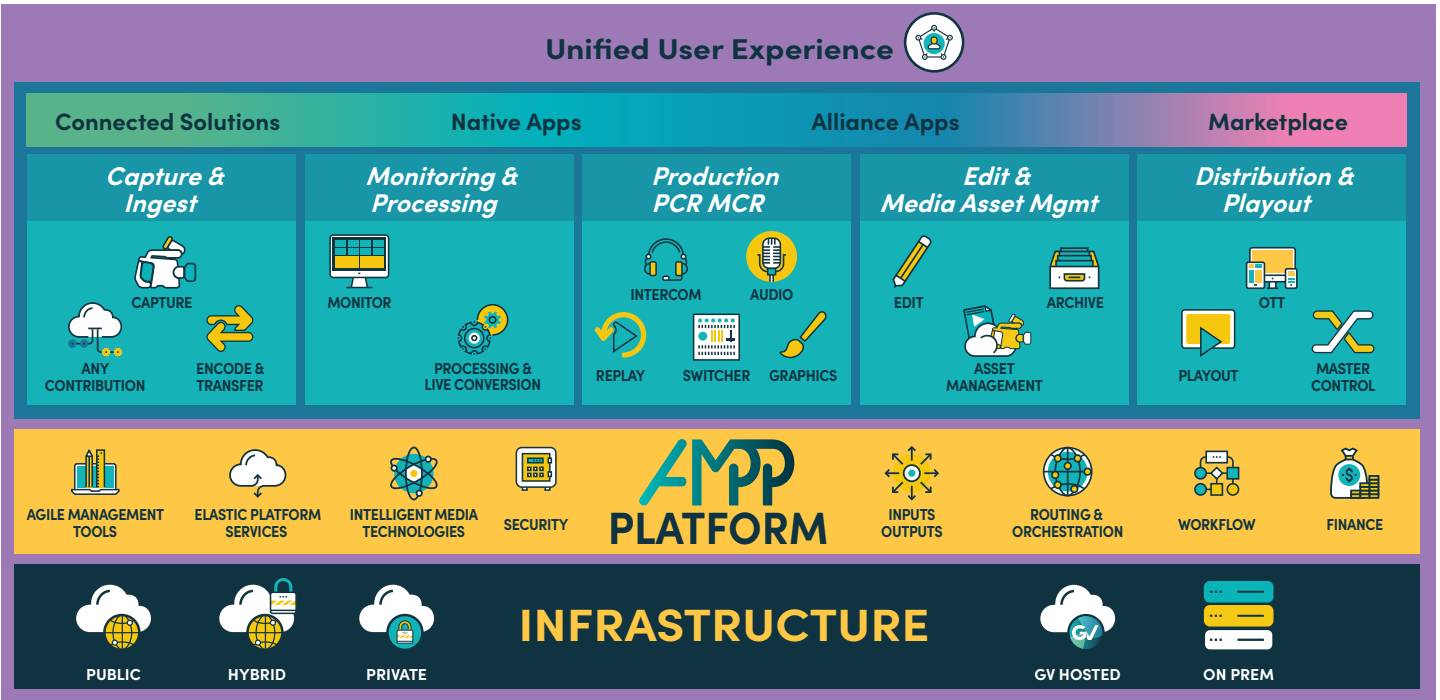
AMPP supports the following edge computing options:

- **Existing Grass Valley products:** Grass Valley is providing new technology updates that allow existing hardware or software to integrate with cross-platform equivalents running on AMPP. For example, production switcher panels may be connected to K-Frame™ CS X, and GV STRATUS® may be connected to Framelight X. GV Orbit® may also be used with AMPP as a single interface for SDI, IP and cloud network control. For details, please see product-specific information on the Grass Valley website.
- **AMPP Edge:** Available in three different sizes, AMPP Edge is an on-prem device that provides local I/O in SDI or SMPTE ST 2110 as well as compute for various AMPP applications. For details, see the [AMPP Edge webpage](#).
- **Third-party encoding solutions from Alliance members:** Many of the most popular signal encoding/decoding solutions have a validated integration with AMPP. For details, see the [AMPP Alliance webpage](#).

Cloud Computing

For productions such as live events that change requirements on a frequent basis, or require coordinating geographically distributed teams, hosting the data plane in the cloud provides many benefits, including rapid scaling, simple remote access and integration of AI capabilities.

Using cloud computing also makes AMPP highly secure and reliable with the best in secure processing running on multiple availability zones that are continuously monitored.



The AMPP Control Plane

The AMPP control plane and the applications it enables use a microservices architecture. As the name implies, this architecture is structured as many smaller services that are loosely coupled and independently deployable.

When connected to the cloud, a single AMPP control plane is distributed across clusters of compute in different availability zones. AMPP operates on platforms distributed around the world so that customers access a platform that is local to them. To manage a large number of microservices distributed over multiple data centers requires a management layer that handles the lifecycle of stopping and starting all of the individual services and managing the resources they have available. Grass Valley uses Kubernetes to manage the control plane. Kubernetes groups containers that make up an application into logical units for easy management and discovery. Kubernetes builds upon 15 years of experience of running production workloads at Google, combined with best-of-breed ideas and practices from the community.

AMPP Local

Some working environments want the flexibility of microservices and interchangeable compute nodes for data processing, but do not want to maintain a link to the cloud. For these situations, AMPP Local is a configuration of AMPP that hosts both the data plane and the control plane on-prem in COTS servers. Like traditional hardware production environments, AMPP Local is only connected to the cloud during initial configuration and for software or license updates. No persistent connection to the cloud is required.

Inputs and Outputs

Unique I/O capabilities. Unlike hardware devices with a fixed number of inputs and outputs with specific formats, AMPP can have an unlimited number of inputs and outputs that support all common local input and output formats including SMPTE ST 2110, NDI and SDI for easy connection to your existing devices. Global inputs and outputs allow you to stream between different AMPP nodes – either site-to-site, ground-to-cloud, or between cloud instances with low-latency and high-quality streaming. In addition, built-in encoders and decoders for compressed I/Os support all common formats such as RIST, SRT, RTMP and MPEG-TS, which gives you a wide variety of profiles to fit your needs.

While a common production format is not required within AMPP, inputs and outputs can be set to encode, decode, or transcode to alternative formats as required.

Webcapture. Remotely bring in user content from a web camera and PC desktop while monitoring the program output in real time.

HTML5 Graphics Input. Easily add graphics to the production or delivery using HTML5 from Alliance members like Singular.live and Flowics. Can also be used to bring in any HTML content to the production.

Test Signal Generator. The AMPP Test Signal Generator comes with a variety of test signal parameters enabling testing across the entire fabric. Includes a preview panel that displays the output stream as periodically updated thumbnails of the video stream. The Generator can produce: Color bars, solid colors, tone, and sync signals.



Routing

Automatically detect all available running signals and route them to their destination. AMPP enables local routing of NDI, SMPTE ST 2110 and TS sources on an edge device and global routing between multiple compute nodes using either AMPP Streaming protocol or protocols such as SRT or RIST. For integration with audio devices, AMPP supports Dante, AES3 and Pulse-code modulation (PCM).

For easy operation, virtual routing panels are simple to set up in any AMPP UI. Any AMPP signal can be mapped to a routing panel regardless of format to provide single-click changes to the view you want to see. If you prefer hardware to virtual panels, sources – as well as many other system actions – can be mapped to a Grass Valley MAV panel, Elgato Stream Deck or other external control device.

Orchestration. The AMPP Dashboard allows you to visually monitor all your applications and flows at a glance. Your entire AMPP account can be made visible and thumbnails allow advanced monitoring functionality of all flows and applications in your account. With the AMPP Dashboard you can edit, start, and stop workloads – including workloads that integrate Alliance solutions – with a single click.

For hybrid workflows, GV Orbit may also be used with AMPP to provide a single interface for SDI, IP and cloud network control.

Changeover. To provide consistent uptime, AMPP supports an automatic fail-over on loss of signal. Supporting many alternative use cases, the A and B inputs can be different source types such as a playout channel and a clip player, as well as different formats such as SMPTE ST 2110 and NDI. For a complete discussion on setting up system redundancy and maintaining high availability in AMPP, see the [Resiliency in AMPP whitepaper](#).

AMPP also enables API control of Alliance member endpoints. For details on endpoint options, see the [AMPP Alliance webpage](#).

Monitoring

Remote viewing. Each Flow Monitor enables low-latency live streaming from anywhere to everyone. Accessible from any Internet browser with variable bandwidth setting, Flow Monitors can provide high-quality viewing of a single signal or display multiple signals in a Mosaic or Multiviewer.

Multiviewer. A fully customizable multiviewer that allows you to create different layouts with a single click. Sources can be switched in seconds and the multiviewer editor enables you to create layouts in minutes. Like all routing services, the multiviewer supports multiple formats.

Video Scope. AMPP allows you to QC incoming sources with a built-in video scope that offers Vectorscope and RGB Parade modes.

Software

While the infrastructure is critical in bringing together the signals that are basis for new content, it is the AMPP software that makes the platform truly unique. Capable of running in any data center or cloud environment, AMPP uses a modern microservices architecture that allows the system to quickly scale to any size. Users spin up or spin down applications as needed and to only pay for the services used.

The AMPP platform gives media providers the power to easily transition to cloud- and data center-based operations because it addresses the concerns that complicate IP and cloud deployments – particularly network connectivity and latency.

GV AMPP's architecture is based on five core technologies and 17 patented advancements:

- **GV Intelligent Media Fabric:** Unique management for distribution of digital media (video, images, audio and metadata).
- **GV Intelligent Media Connect:** Unique management for connections between devices that distribute and process digital media (video, images, audio and metadata).
- **GV Intelligent Media Timing:** Unique management for the timing of digital media (video, images, audio and metadata).
- **GV Intelligent Media Identity:** Unique management of the identity of connected devices that process and distribute digital media (video, images, audio and metadata) and manage the identity of the digital media (video, images, audio and metadata) itself.
- **GV Intelligent Media Streams:** Unique management for processing digital media (video, images, audio and metadata) based on the media itself.

For detailed information on the technology behind the AMPP platform, please see our library of AMPP whitepapers. [Download the complete library](#) to learn more about: AMPP System Architecture, Latency, Resiliency, Security, and Single Sign-On (SSO).

The following services are built into the AMPP platform.

User tools

GV UI is an intuitive user interface that can host multiple HTML5 web components for an at-a-glance view of all your AMPP platform services as well as the content creation and distribution applications. Easily define and build your own interface and then create, load and save different layouts suited for any production and user.

AMPP Control Panels enable the design of operator-centric user interfaces that provide each user only the control required to perform their tasks, reducing complexity and minimizing the risk of on-air errors.

Logging. The AMPP Log Viewer provides detailed logs of all actions in an account with easy identification of fabrics. An extensive filter menu makes it simple to find and verify actions taken.

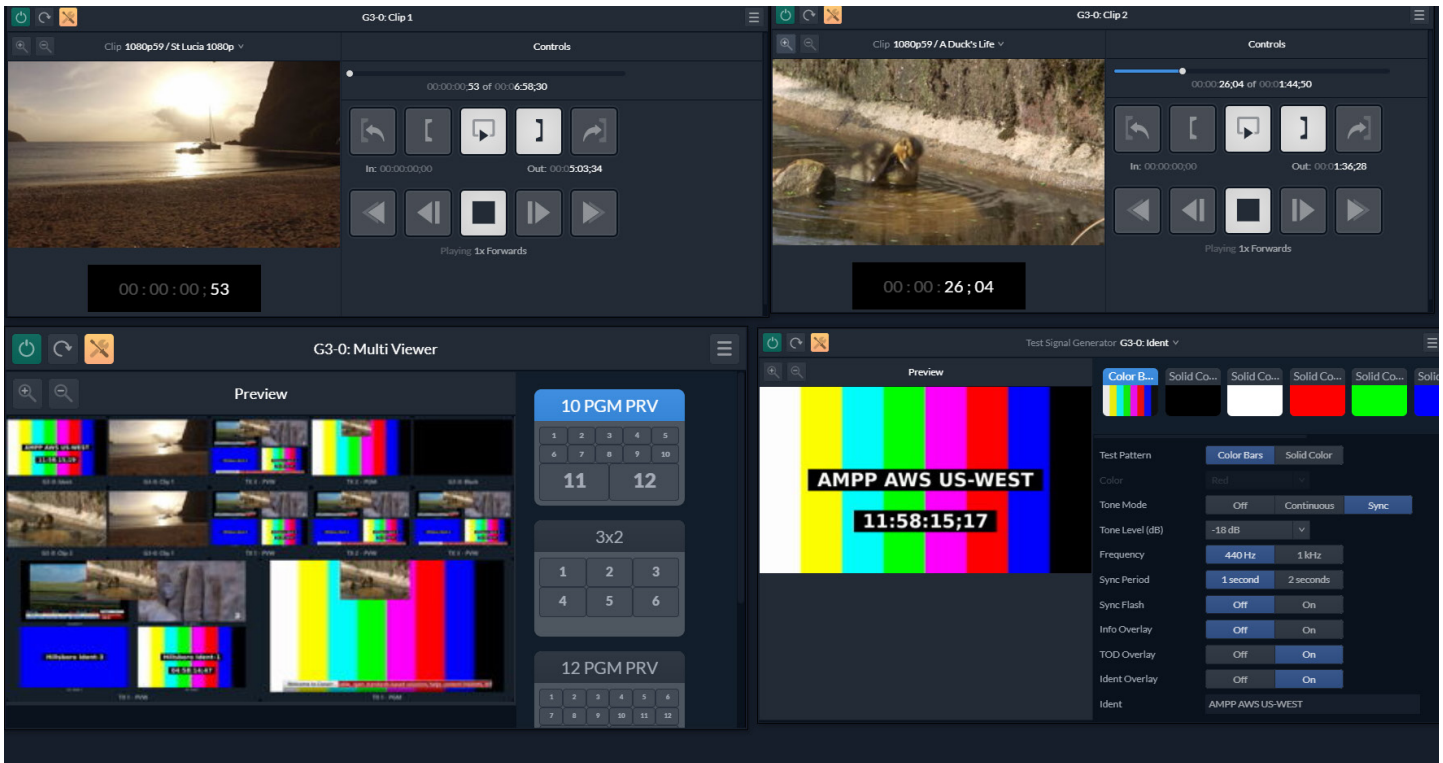
User management. AMPP is designed to allow entire production teams to simultaneously access the system from wherever they are working. To ensure security, each team member can have a single sign on password that applies to the entire system. AMPP currently offers support for the following methods of providing SSO integration: Okta, Azure AD, AWS Cognito and OpenID Connect + OAuth 2.0.

Compute control. Connect the public cloud infrastructure to AMPP and control the spin up/wind down of public cloud compute instances directly from the AMPP tools so that users can fire up a workflow which includes all of AMPP applications and compute in a single operation.

Appstore. Choose the specific applications required for a media workflow from the AMPP Appstore. Review and manage application software versions across entire system from a central location.

Health Discovery. The AMPP Health Dashboard provides an overview of all workloads in an account and their health state at-a-glance. Workloads are grouped to provide a systemized overview that may be filtered on specific application groups and status with a default filter to show all critical status workloads.





Business tools

Resource Manager. View all workloads, nodes and snapshots at a glance. Create, start, stop, update and configure all applications of your AMPP account. Select where you want a workload to run. Store configurations in snapshots with tags for recurring productions. When starting applications, you can choose to automatically update to the latest software or stay on a specific version.

Billing Portal. Easy-to-use analysis in the AMPP Billing Portal makes it simple to understand and account for how AMPP workflows are used. Going well beyond a basic list of workloads and run times, authorized users can access a variety of methods for analyzing usage data for any given period. Tagged workflows make regularly used reports even simpler to identify. Export data as a CSV file for use in other tools.

Security

AMPP takes a multi-layered approach to security to protect media assets from cyber threats, data breaches, and other security risks.

- **Secure architecture:** AMPP's cloud-based architecture is designed with security in mind, incorporating multiple layers of security controls, including firewalls, intrusion detection and prevention systems, and network segmentation.

- **Access controls:** AMPP employs strict access controls, requiring authentication and authorization for users, systems, and applications to access its resources. User access is granted based on the principle of least privilege, ensuring that users only have access to the resources they need to perform their job functions.
- **Encryption:** AMPP uses encryption to protect data at rest and in transit, ensuring that data cannot be accessed or tampered with by unauthorized parties. Data is encrypted using industry-standard encryption algorithms, and keys are managed securely.
- **Compliance:** AMPP complies with industry standards and regulations, including ISO 27001, SOC 2, and GDPR. It undergoes regular third-party audits to ensure compliance with these standards and to identify any potential security vulnerabilities.
- **Incident response:** AMPP has a comprehensive incident response plan in place to address security incidents, including a 24/7 security operations center (SOC) that monitors the platform for security threats and responds to security incidents in real time.

Overall, AMPP's multi-layered security approach provides robust protection for media assets, ensuring that they are secure from cyber threats, data breaches, and other security risks. By leveraging AMPP, media companies can have confidence that their media assets are protected and secure.

Support Solutions

Central to supporting Grass Valley's AMPP Platform is the Network Operations Center (NOC). It is manned 24/7/365 – proactively monitoring the health of the AMPP cloud platforms and responding to support calls from customers. The NOC can be contacted via phone, email, web portal or Live Chat (currently Slack) and will provide the first level of support as well as case and incident management. If a case requires more specialist investigation it is referred on to Grass Valley's extensive network of subject matter expert (SME) engineers spread

throughout the globe. From Monday–Friday, Grass Valley operates a “follow-the-sun” model, where cases are picked up by the Grass Valley region currently in business hours. From the end of the working day in Americas on Friday until the start of the working day in Asia-Pacific on Monday, there will be SMEs for each of Grass Valley's product specialties available on-call to respond to critical cases. This all helps to ensure that when customers need Grass Valley's support, we can provide it quickly and efficiently.

Specifications

May be hosted on these infrastructures:

- Amazon Web Services (AWS)
- Google Cloud Platform (GCP)
- Microsoft Azure
- Or provided by Grass Valley

Video codecs:

- AVC/H.264: 4:2:0 or 4:2:2, 8- and 10-bit
- HEVC/H.265: 4:2:0 8- and 10-bit

Audio codecs:

- AAC
- Dante
- Opus
- Dolby E, Digital (AC3) and Digital Plus (E-AC3)
- MPEG-1 Layer 2

WAN/LAN transport protocols:

- AMPP Streaming
- NDI
- RIST Basic and Main Profile
- SRT
- RTMP(S)
- SMPTE ST 2022-2 / MPEG-TS

Encryption and protection:

- DTLS-SRTP encryption
- Flex-FEC

Automation:

- SCTE-104 and SCTE-35

Security:

- Conforms to the best IT practices of a representational state transfer (REST) architecture
- IP streaming in AMPP is encrypted when applicable
- AMPP authentication is handled through an Identity Service which can optionally delegate authentication to a third-party server (e.g., OKTA)
- To ensure strict security standards are maintained, Grass Valley also regularly conducts third-party penetration testing

Ordering

Due to the variety of ways the AMPP platform may be installed and operated, including integration with existing equipment, please contact a Grass Valley sales representative to architect the best solution for your application. Solutions that run on the AMPP platform may be selected from the AMPP Appstore. Access to the Appstore is set up when the AMPP platform is enabled.

This product may be protected by one or more patents. For further information, please visit: www.grassvalley.com/patents

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