WHAT LIES BEYOND THE CLOUD?

manifold CLOUD

BLADE Runner

THE FUTURE OF LIVE PRODUCTION.

manifold — arkona

# EasyIP

## THE IP-READY BROADCAST SOLUTION

EASY-IP is a comprehensive live production infrastructure solution that seamlessly integrates **BLADE//runner** and **manifold CLOUD** hardware and software into a unified platform for video and audio routing, multiviewing, and processing. Certified and tested end-to-end, EASY-IP ensures a smooth transition to a flexible, scalable, and future-proof IP live broadcast production environment.

**SMALLER** With the best-in class density of the BLADE//runner AT300, paired with the blistering performance of COTS FPGA accelerators, EASY-IP delivers dramatic savings in rack space, power, and cooling making it a leaner, greener alternative to traditional SDI infrastructure.

**SMARTER** Powered by software-defined architecture and driven by continuous innovation. Processing resources are instantiated on demand, services are orchestrated automatically, and its flexible workflows can be saved, reused, and redeployed in seconds making it one of the most agile and intelligent systems in the industry.

**SIMPLER** With a unified control interface and native support for REST API, NMOS, and Ember+, EASY-IP integrates seamlessly into existing broadcast environments. Additionally, EASY-IP can be configured with high-capacity switches and hardware control panels to provide a complete turnkey solution upon request.

A smooth transition to a flexible, scalable, and future-proof IP live broadcast environment.

## EASY-IP SIMPLIFIES CONTROL AND OPERATION

EASY-IP is a tested and certified solution by arkona and manifold that ensures a smooth transition to a flexible, future-proof IP infrastructure.

EASY-IP simplifies integration with existing broadcast facilities by utilizing industry-standard control protocols and a centralized control point.

EASY-IP includes high-capacity switches and, optionally, hardware control panels to provide a complete turnkey solution.

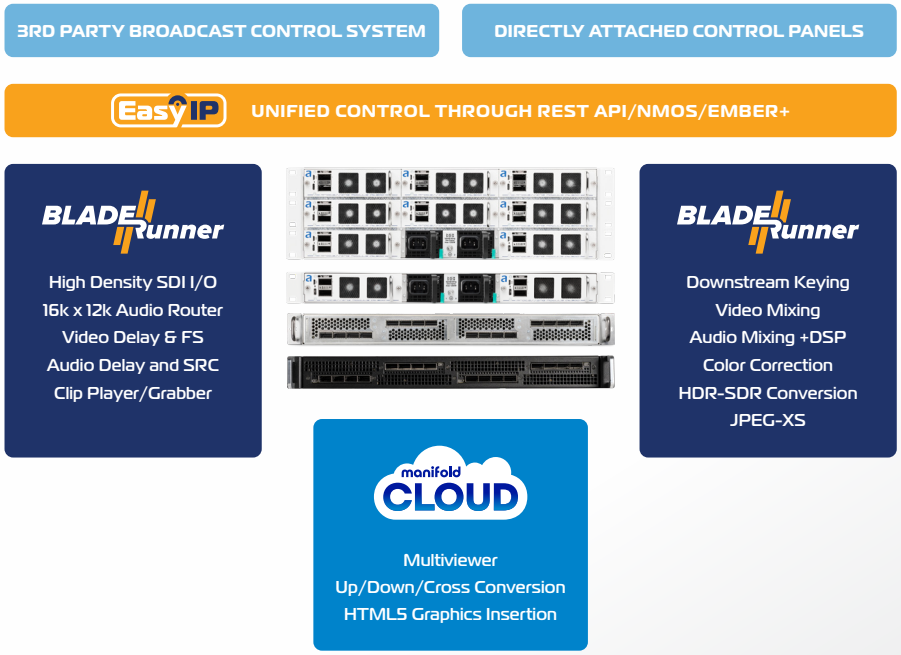
## HOW EASY-IP WORKS

EASY-IP combines routing, multiviewing and audio/video processing in a compact, flexible software defined solution.

Centered around the dual 100GE BLADE//runner AT300, the EASY-IP solution delivers high-capacity UHD capable routing with clean and quiet switching. Built-in audio/video alignment ensures perfect lip-sync across all sources, while the massive mono audio router offers any-to-any routing, gain control, and sample-rate conversion.

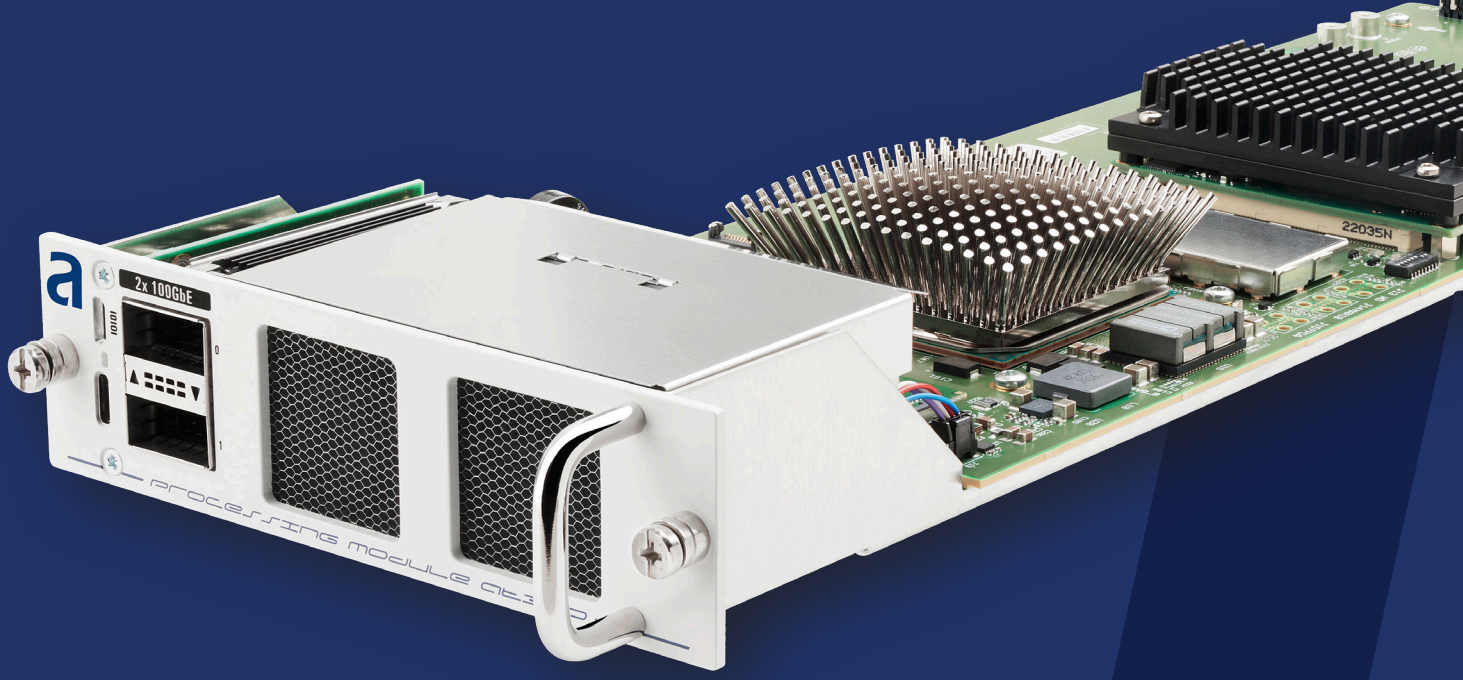
Beyond video and audio routing and synchronization, EASY-IP offers advanced processing features on demand. Add ultra-low-latency multiviewing and broadcast-quality up/down/cross conversion with manifold CLOUD, JPEG-XS compression, audio mixing and DSP, color correction and HDR-SDR conversion and flexible video mixing with still store, clip player, and keyer.

All features are pooled, virtualized, and deployable on both AT300 hardware and COTS FPGA platforms for maximum performance and flexibility.






manifold




BLADE//Runner®

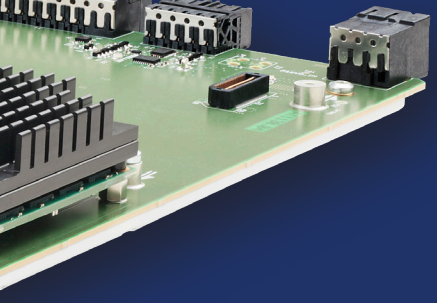
## HIGH-PERFORMANCE COMPUTING FOR BROADCAST LIVE PRODUCTION

### AT300

**BLADE//runner is powered by the AT300, a high-performance programmable acceleration card (PAC) with dual 100GbE interfaces and a high-bandwidth memory (HBM) FPGA.**

### AT300 – FRONT VIEW

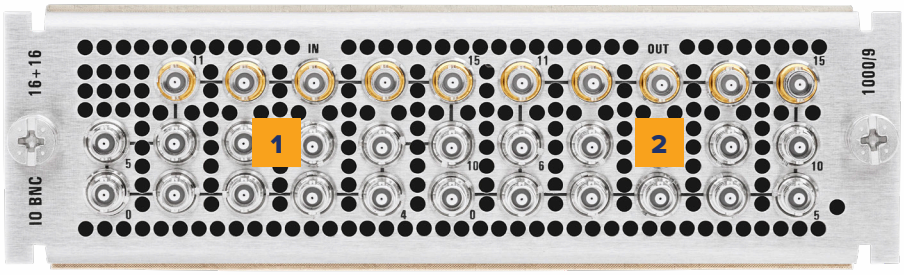

| | | | | | |
|---|---|---|---|---|---|
| 1 | Console Port | 3 | USB C MGMT Port | 5 | Dual Fans |
| 2 | Status LED | 4 | 2x QSFP28 | | |



## REAR-PLATES

When combined with one out of several different optional rear-plates the AT300 supports up to 16 inputs and 16 outputs of 12G SDI, MADI and external reference inputs (GPS, Blackburst and Tri-level).

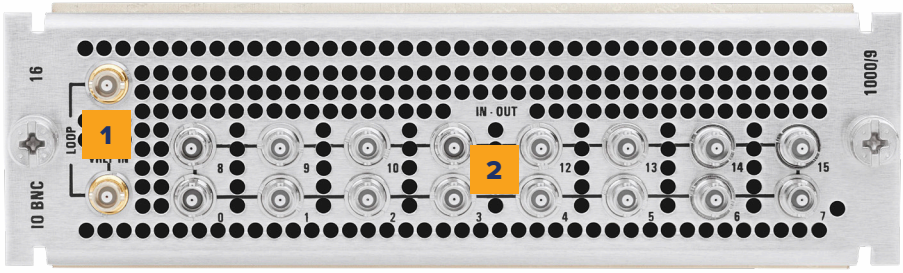
### IO BNC 16+16




**1** 16 input micro-BNC (UHD, 3G, HD, SD, MADI)

**2** 16 output micro-BNC (UHD, 3G, HD, SD, MADI)

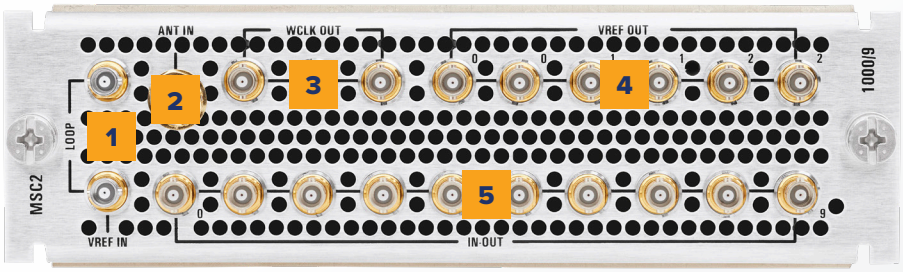
### IO BNC 16




**1** Video Reference Port with loopback

**2** 16 bi-directional micro-BNC (UHD, 3G, HD, SD, MADI)

### IO MSC2




**1** Video Reference Port with loopback

**2** GPS antenna input

**3** 3x Wordclock Output

**4** 3x dual video reference outputs

**5** 10 bi-directional micro-BNC (UHD, 3G, HD, SD, MADI)



arkona

# BLADE//Runner CORE

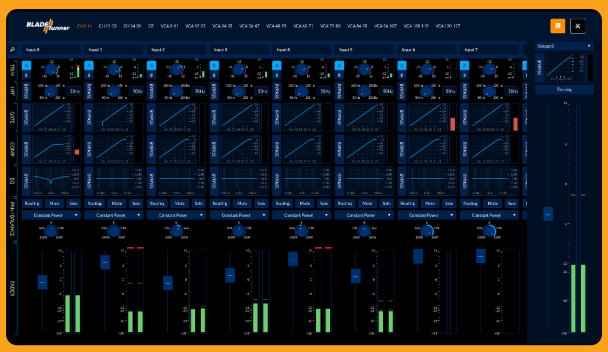
**FLEXIBILITY AT THE CORE. At the heart of every AT300 is flexibility. Each card can load one of several software applications (APPs), each optimized for specific broadcast use cases. A single CORE license gives you access to all APPs, with the freedom to switch between them as needed.**

▼ **INCLUDED IN BLADE//RUNNER CORE**

## AUDIO VIDEO PROCESSING (AVP)

A comprehensive gateway and processing engine for audio, video, and metadata. AVP provides frame sync, audio/video delay, embedding and de-embedding, sample-rate conversion, and clip play/record. It supports key SMPTE standards (ST2110, ST2022-6, ST2042 VC-2, ST2022-7) and includes a massive 6k × 6k mono audio router across SDI and IP I/O.

## IP AUDIO (IPA)



The BLADE//runner IP Audio app includes a built-in web-based GUI but can also be controlled via external hardware panels, through the API or in any combination of the above.

A dedicated non-blocking audio router with 16,384 inputs and 12,288 outputs — large enough to cover an entire facility. IPA includes mono, stereo, and mix-minus mixing instances that can be freely assigned and cascaded in any order without additional delay. End-to-end latency is just two samples. Control is via the built-in web GUI, hardware panels, API, or any combination thereof.

## JPEG-XS (JXS & JXS16)

Low-latency JPEG-XS encode/decode with up to 16 freely routable codecs. Configure as all encode, all decode, or a mix (e.g. 8/8). Each codec supports UHD/FHD/HD for up to 16 UHD channels total. In addition, JXS apps provide full uncompressed ST2110/2022-6 gateway functionality plus AV processing.

**Note:** JPEG-XS codecs require additional licensing.

**INCLUDED WITH ALL *CORE* APPS**

## PTP & SYNC GENERATION

All CORE APPs include PTP Grandmaster functionality as well as the ability to generate Blackburst, and Tri-level sync. Up to three genlocks can be created, with the option to lock PTP to an external sync or generate sync from PTP.

BLADE//Runner® MAX

**WITH MAX, NOTHING IS HELD BACK.** **It includes everything in CORE and then unlocks a full suite of audio, video, and signal processing capabilities, all under a single license. No piecemeal options, no hidden add-ons. What other vendors divide across multiple products, MAX delivers in a single flexible license.**

▼ **UNLOCKED WITH BLADE//RUNNER MAX**

## VIDEO COLOR CORRECTION & CONVERSION (VCC)

MAX enables pooled RGB/YUV color correction and SDR/HDR color-space conversion using tetrahedral interpolation with user loadable 3D LUTs, assignable to any video source in the AT300.

## VIDEO MIXING & KEYING (VMK)

MAX adds full-featured video mixing and keying to the AVP APP. Any video source, including cascaded VMK outputs, can be used to build downstream keyers or even multi M/E switchers, all with guaranteed microsecond latency.

## AUDIO MIXING (AMIX)

With MAX, the AVP and JXS apps gain broadcast grade mono, stereo, and N-1 mixers. All mixing instances are freely routable, cascaded in any order, and introduce zero additional delay.

## DIGITAL SIGNAL PROCESSING (DSP)

Enabling MAX turns the IPA APP to a complete broadcast audio console, with dynamic compressors (comp/limit/gate/auto-gain), sample-accurate and multi-tap delays, reverb, EQ, plus true-peak and loudness metering.



# LIMITLESS LIVE PRODUCTION

arkona

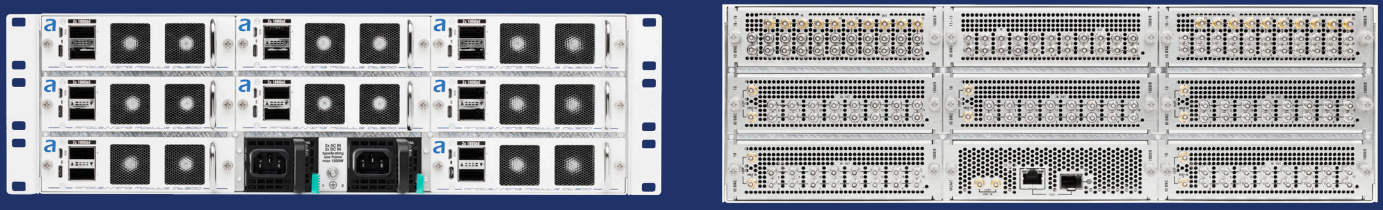

BLADE//runner frames are available in 1, 2 and 3RU sizes that provide redundant power and optionally a centralized out-of-band management Gigabit Ethernet port (Electrical and Optical) that connects to all the cards in the frame. Designed around a backplane-free architecture where each card is independent, it is possible to easily scale a BLADE//runner system across multiple frames and multiple locations where processing is placed at the most appropriate location to meet the demands of the user. Both the AT300 programmable acceleration cards as well as rear-plates are hot-swappable.

The 1RU frame holds 2 cards, the 2RU holds 5, and the 3RU holds 8.
In addition, there is a 2RU “low-noise” frame that has additional in-frame fans and holds 2 cards.

## **BLADE//RUNNER – 1RU** (HOLDS 2 CARDS)

## **BLADE//RUNNER – 2RU** (HOLDS 5 CARDS)

## **BLADE//RUNNER – 3RU** (HOLDS 8 CARDS)



## **BLADE//RUNNER – 2RU LOW NOISE** (HOLDS 2 CARDS)


## BLADE//RUNNER – FRONT VIEW


## BLADE//RUNNER – REAR VIEW




1 AT300 Front Plate (refer to page 5 for details)
2 Redundant Power Supply (Hot-Swappable)
3 Module Rear Plate (refer to page 5 for details)
4 Video Reference Input and Loop-Thru; blackburst or tri-level distributed via backplane to all PACs in a frame
5 1x 1 Gigabit Ethernet available through RJ45 or SFP+ for control and monitoring (allows for centralized access to all core processing blades in a frame)

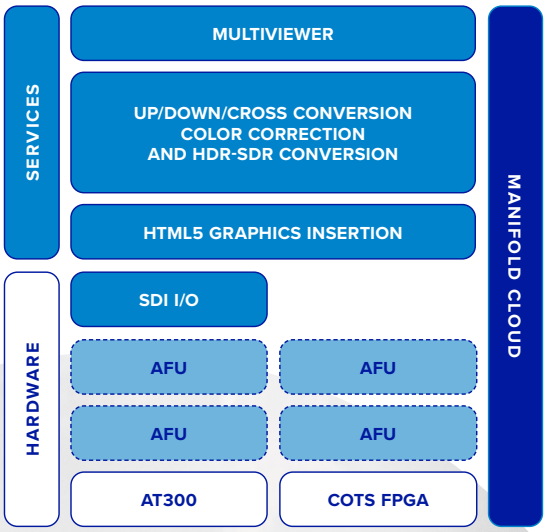
## IO MGMT REAR-PLATE


All frames can optionally be configured with the IO_MGMT rear-plate providing a 1GE management interface (RJ45 and SFP) which connects to all blades in the frame thereby simplifying out-of-band control. In-band control is available on either of the two 100GE interfaces.

1 Video reference port with loopback
2 1GE centralized management port (RJ45 and SFP+)

# manifold CLOUD

**manifold CLOUD is a software solution that provides multi-viewing, up/down/cross conversion, color correction, color space conversion and other live production functionality as services through a single-sign-on web UI.**




manifold CLOUD offers the same flexibility and on-demand access found in leading virtualized computing environments, but delivered entirely within a private, on-premises infrastructure.

Users can provision and manage resources for their broadcast workflows with the same ease and scalability typically associated with hyperscale platforms, all while maintaining complete control over their dedicated systems.

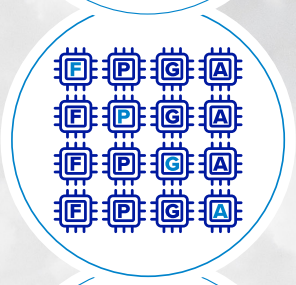
manifold CLOUD offers a comprehensive, single-sign-on web UI for live broadcast production, mirroring virtualized computing environments but within a private, on-premises infrastructure. It provides easy, scalable resource management while maintaining full control over dedicated systems.

Built on a state-of-the-art service-based architecture, manifold CLOUD was designed to offer all the benefits of cloud and virtualization while retaining the strict performance requirements of Tier-1 live broadcast production.

manifold CLOUD provides the scalability, resiliency, automatic provisioning and cost efficiency of commodity hardware while supporting large, live uncompressed workflows with ultra-low latency.

### SOFTWARE DEFINED PRODUCTIONS

At its core, manifold CLOUD provides a service-based architecture with hardware virtualization. Production workflows are created by cascading services together, which can be saved, reused, and altered as required. A complete production can be turned up in seconds by simply loading a configuration



### THE POWER OF FPGA WITH THE ECONOMICS OF COTS

Harnessing the power of off-the-shelf FPGA accelerators, manifold CLOUD takes advantage of the cost and development speed of COTS compute while preserving the performance required by live broadcast productions, truly offering the best of both performance and cost

### DENSITY AND ENERGY EFFICIENCY

manifold CLOUD packs Terabit-class processing into each rack unit, easily outperforming CPU and GPU-based systems in performance, density, and power efficiency an order of magnitude beyond what traditional compute platforms can deliver

## manifold CLOUD SERVICES

*manifold CLOUD offers a variety of live production audio/video processing and monitoring functionality.*

### manifold MULTIVIEWER

A high-performance, ultra-flexible multiviewer designed for live production. Our distributed multiviewer architecture enables up to 512 PIPs per head from any source, with no more than 2 frames/fields of end-to-end latency.

The unique distributed architecture of the manifold MULTIVIEWER utilizes a two-step process. First, for each video source, a pyramid of high-quality, low-latency sub-resolution proxies is generated and streamed back to the network as individual multicast feeds (mipmaps). Proxy generation is distributed across the accelerators in a cluster so total capability scales with the number and performance of accelerators assigned, ensuring truly limitless scalability.

In the second step, outputs ("heads") are assembled by subscribing to the appropriate sub-resolution level for each PIP size within a layout. Final positioning, cropping, and scaling are then applied - with any additional scaling needed always uses a larger proxy resolution to ensure the highest image quality of the final output.

As an added benefit, mipmap proxies also make for excellent low-latency monitoring feeds for workstations and any UHD sources automatically receive a high-quality low latency full-HD proxy which can be used for production purposes.



### manifold UDX

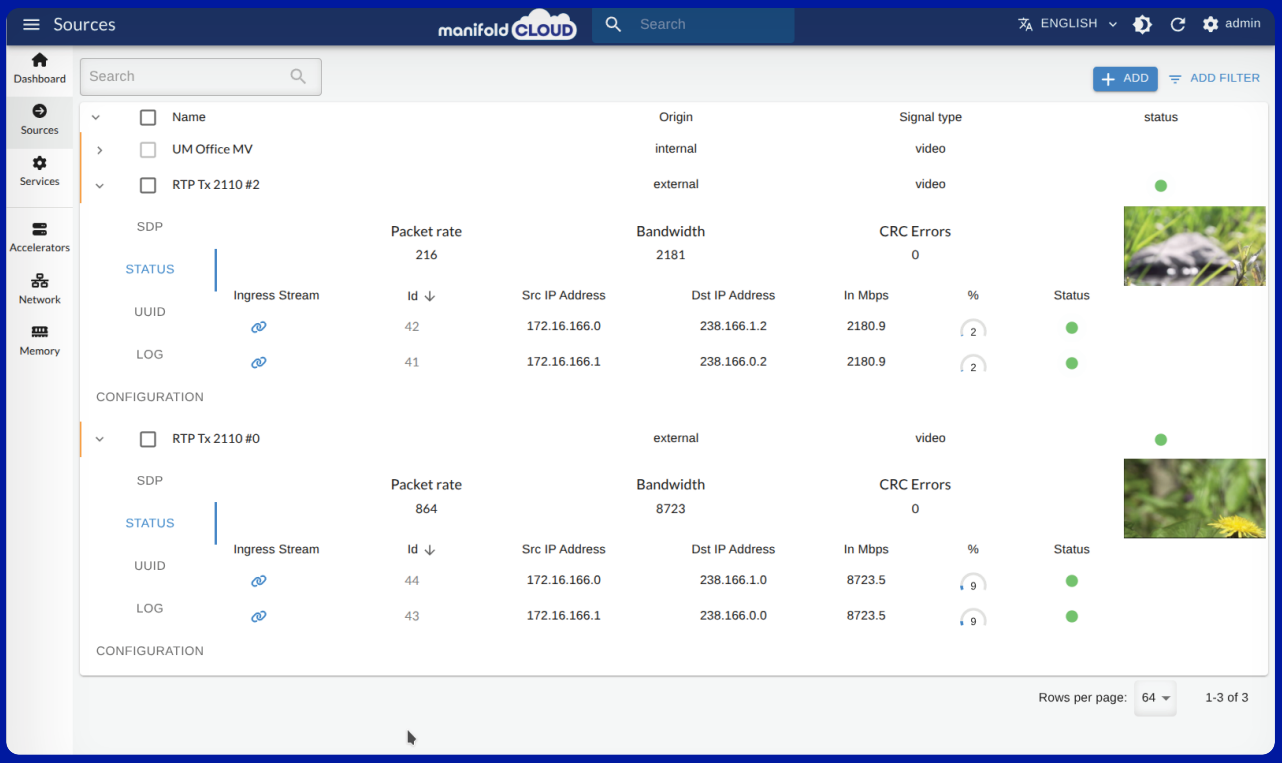
A broadcast-grade Up/Down/Cross converter for ST2110 sources. This service performs seamless video format conversion between HD (720p/1080i), Full HD (1080p), and UHD (2160p), with high-quality deinterlacing. The converted output is delivered as a new ST2110 source within the production cluster.

### manifold GFX

An HTML5 graphics overlay engine that enables real-time compositing directly within manifold CLOUD. Graphics from any user-defined URL are layered onto a video source to create a new composited stream, instantly available within the system. Alternatively, manifold GFX can output the HTML5 content as a standalone ST2110 stream, effectively acting as a scan converter for web-based visuals.

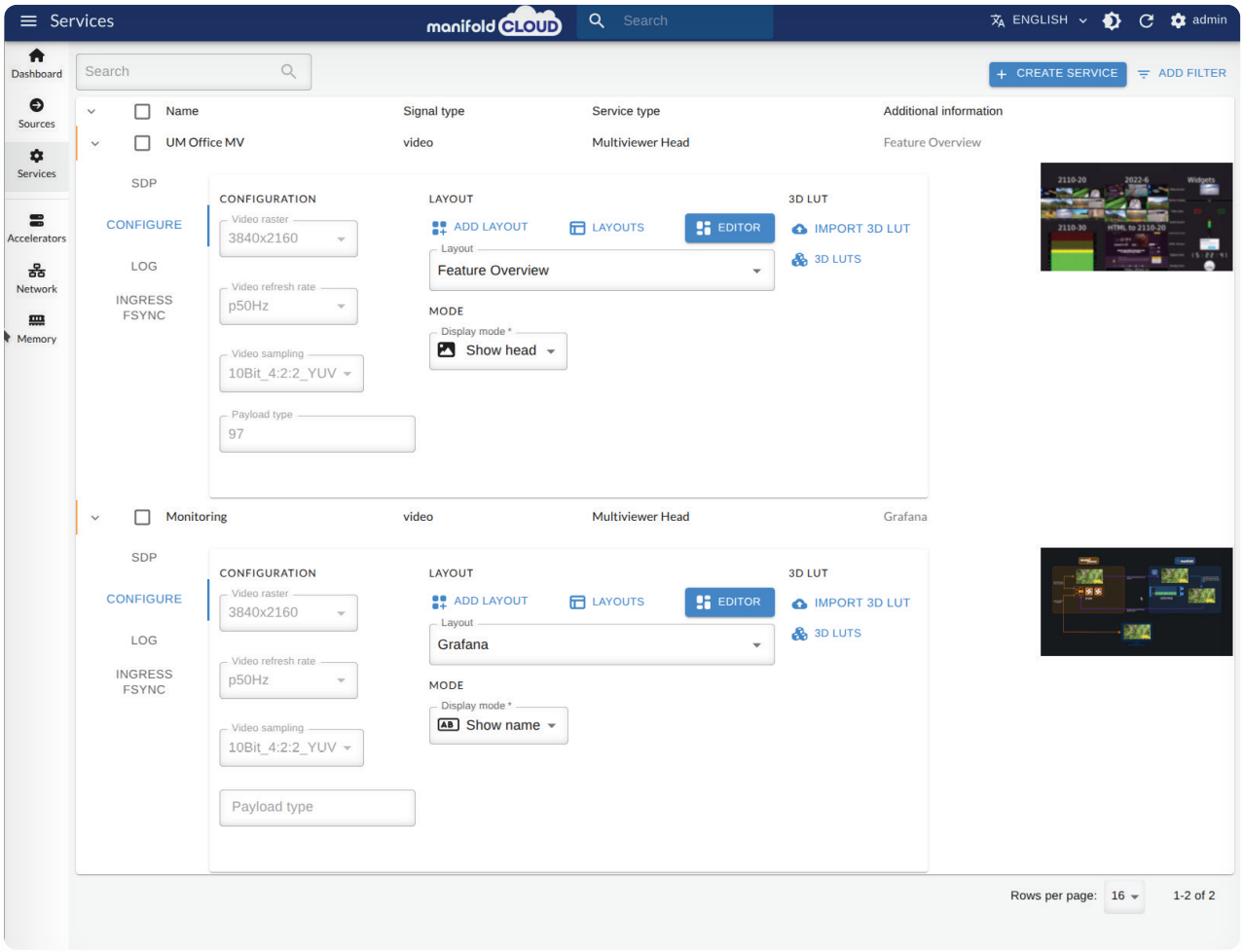
## INTUITIVE WORKFLOW

Designed with operator simplicity in mind through a workflow centered on sources and services. manifold CLOUD presents audio, video, and metadata sources in an easily searchable and filterable list. Users can directly inspect sources and view key information directly from the UI.




At the heart of manifold CLOUD is the services section, where media processing functions like multiviewers, up/down/cross converters, color correctors, and delays are easily created and configured on demand. Services take existing sources as inputs and produce new sources as outputs. These newly generated sources are then visible in the sources section, making them available for use as inputs for other services or for consumption by other devices.

# Intuitive web UI for comprehensive control and management of sources and manifold CLOUD services.






manifold CLOUD streamlines service creation by automatically assigning services to accelerator cards and managing all IP addressing and networking. This automation frees operators to concentrate entirely on their workflow.

In the event of hardware or network failure, services are automatically restored on an alternate accelerator card for maximum resiliency. For even higher redundancy, the same service can be created multiple times and run on different accelerator cards.

# *Live Performance. Cloud Intelligence.*

Designed to run in a private cloud environment on Intel FPGA acceleration cards from multiple manufacturers, manifold CLOUD takes advantage of the fast development cycles of off-the-shelf chip and server manufacturers while lowering capex and power costs by up to 90% compared to CPU and GPU based solutions.

manifold CLOUD

**PAC TECHNOLOGY PARTNERS**

arkona · BittWare a molex company · prodesign FALCON-NEST

## Certified Hardware Accelerators

| NAME | MANUFACTURER | ETHERNET I/O | SDI I/O | PROCESSING PER RU |
|---|---|---|---|---|
| AT300 | arkona | 2 x 100GE | 16x16 mini BNC | 600Gbps |
| 520N-MX | BittWare | 4 x 100GE | N/A | 1.6Tbps |
| Falcon 1SM21 | Pro Design | 4 x 100GE | N/A | 1.6Tbps |
| IA-860m | BittWare | 2 x 400GE or 8 x 100GE | N/A | 3.2Tbps |
| Falcon AgileX 7M | Pro Design | 2 x 400GE or 8 x 100GE | N/A | 3.2Tbps |

**Example of manifold CLOUD service density**

| | BittWare | | | | ProDesign | | | | arkona | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 520N-MX | | IA-860m (Preliminary*) | | Falcon 1SM21 | | Falcon AgileX 7M (Preliminary*) | | AT300 | | |
| | Per Accelerator | Per 1RU | Per Accelerator | Per 1RU | Per Accelerator | Per 1RU | Per Accelerator | Per 1RU | Per Accelerator | Per 1RU | Per 3RU |
| **SERVICE INPUT** | UP TO | | | | | | | | | | |
| 1.5G | 200 | 800 | 400 | 1600 | 200 | 800 | 400 | 1600 | 100 | 200 | 800 |
| 3G | 100 | 400 | 200 | 800 | 100 | 400 | 200 | 800 | 50 | 100 | 400 |
| 12G | 25 | 100 | 50 | 200 | 25 | 100 | 50 | 200 | 12 | 24 | 96 |
| **MULTIVIEWER SERVICE** (OUTPUTS/HEADS) | UP TO | | | | | | | | | | |
| 3G | 36 | 144 | 96 | 384 | 48 | 192 | 96 | 384 | 32 | 64 | 256 |
| 12G | 9 | 36 | 24 | 96 | 12 | 48 | 24 | 96 | 8 | 16 | 64 |
| **UDX SERVICE** (OUTPUTS) | UP TO | | | | | | | | | | |
| 1.5G | 64 | 256 | 192 | 768 | 96 | 384 | 192 | 768 | 64 | 128 | 512 |
| 3G | 32 | 128 | 96 | 384 | 48 | 192 | 96 | 384 | 32 | 64 | 256 |
| 12G | 8 | 32 | 24 | 96 | 12 | 48 | 24 | 96 | 8 | 16 | 64 |

*) Expected availability Q1 2026

## 100% SOFTWARE

- Compatible with off-the-shelf FPGA accelerators from various vendors

## LIVE PERFORMANCE

- Guarantees millisecond latency - as required by Tier-1 live productions
- Chain multiple manifold CLOUD services together while still staying within 1 frame delay end-to-end

## SIMPLE WEB UI

- Intuitive web UI for comprehensive control and management of all audio, video and metadata sources and manifold CLOUD services

## SERVICE FOCUS

- Simple and dynamic operation
- Focus on the WHAT not the how

## BEYOND 4K: FUTURE-PROOF PROCESSING

- The manifold CLOUD architecture easily handles uncompressed HD/3G/UHD and is natively prepared for resolutions up to 64K
- Current-generation accelerators deliver several terabits of processing per RU and manifold CLOUD supports newer and faster accelerators as they become available

## AUTOMATIC PROVISIONING

- Acts as a hypervisor and orchestrator that automatically assigns services to hardware accelerators as required

## INFRASTRUCTURE AS CODE

- Easily save and recall complete productions within minutes

## RESILIENCY

- manifold CLOUD is inherently self-healing and will automatically recover from processing failure

## EFFICIENCY

- Uses 90% less power and space than comparable CPU/GPU-based systems.

manifold cloud



manifold

## A COMMON GOAL

arkona and manifold technologies share a common goal: to simplify and future-proof live broadcast infrastructure through software-defined innovation. Together, we offer a seamlessly integrated platform that empowers broadcasters to build Smaller, Smarter and Simpler Live broadcast production environments.


### arkona technologies GmbH

contact@arkonatech.com
**arkonatech.com**

### manifold technologies GmbH

contact@manifoldtech.tv
**manifoldtech.tv**

Im Leuschnerpark 4,
64347 Griesheim, Germany


08/2025

arkona — manifold