Live Production
Roadshow 2016/2017

4K UHD and IP Live Production Solutions

In collaboration with:

GRASS VALLEY LIVE PRODUCTION

Live Content Captures Audiences

Whether you operate a mobile truck, studio, arena, stadium or other live production venue, Grass Valley is here to help you create productions that make your content come alive.

Grass Valley solutions are designed for today's HD world and the emerging 4K UHD and HDR experience, with the ability to deploy baseband SDI, IP or a combination of both. Grass Valley's commitment to the AIMS interoperability alliance means that customers can migrate to the new IP standards at their own pace.

On The Road

You want it all: lightweight, small footprint, low power consumption, low heat generation, and an integrated workflow that makes for fast setups, quick teardowns and production flexibility — so you can handle any format at any time, maximizing the time your trucks are working and generating revenue. Your clients want that, too.

Grass Valley live production solutions are perfect for your truck — we design and manufacture cameras, production switchers, routing and multiviewer infrastructure, replay controllers, connectivity and networking equipment specifically to meet your needs whether you're working in HD, 4K UHD, IP or a combined solution.

In The Studio

To create a consistently amazing experience for viewers, producers need a solution they can count on and one that offers the flexibility to change as business needs change.

Grass Valley offers reliable modular, scalable solutions designed for live "in studio" productions that can quickly adapt to new workflows and new revenue streams. From cameras to switchers to replay and more — you have a vision and we have a way to get you there.

At The Game

Venues around the world have to compete with fans at home, with instant replays, stats and other visuals that TV viewers have come to expect. Grass Valley solutions help you to keep stadium attendance high with the same media experience TV viewers have come to expect— because being at the game shouldn't come with any limitations.

Grass Valley, a Belden Brand

Throughout its history, Grass Valley has worked closely with broadcasters and media organizations — meeting their needs for acquisition, production and playout. We leverage our unparalleled breadth of expertise and experience to deliver the industry's widest array of broadcast and media solutions that help you stay efficient, tell better stories and meet your mission objectives.

Simply navigating change no longer works. We keep media producers ready for ever-changing consumer landscape by offering solutions that are modular and scalable, ensuring that change will become opportunity.

Sustainable success requires formulating, organizing and implementing long-term plans. And that requires partnering with a company that understands how broadcasters and media companies create and deliver content today, has a clear vision of where that content is headed, offers best-in-class solutions, and knows how to guide each user to achieve success, today and in the future. That company is Grass Valley.

Grass Valley is heavily involved with a number of key industry organizations, including EBU, IBC, NAB, SMPTE, VSF and others, sitting on a number of committees and standards groups. This helps us ensure we can advocate for you and bring the best standards-based solutions to market. In addition, Grass Valley is a founding member of the Alliance for IP Media Solutions (AIMS), an independent trade association founded to promote the adoption and standardization of open protocols for media over IP, leading to assured interoperability for broadcasters.

Grass Valley is part of US-based Belden Inc. As a proven, strategic leader in industrial, enterprise and media market solutions, Belden gives Grass Valley the scale and stability to withstand the cyclical nature of the media business while delivering world-class, global support to the markets we serve.

The question is not *Is 4K UHD in my future?* The question is *When must I be ready to compete in a 4K UHD media world?*

As the amount and availability of media increases, the demand for viewers increases as well. Broadcasters and media companies must seize every opportunity. In today's media landscape, that means 4K UHD, as it is expected that 140 million homes will be watching 4K UHD programming by 2020.

Grass Valley, a Belden Brand, is leading the way with 4K UHD production solutions in all major product categories to help broadcasters and media companies to tell better stories that capture viewers and keep them glued to the action.

4K UHD Realities

4K offers viewers stunning quality and a more immersive television experience. It's an electronic window to the world, with quality that viewers have never seen before. Content in 4K can drive viewer loyalty and engagement to an entirely new level, maximizing advertising revenue.

The combination of an end-to-end 4K production workflow — with the new LDX 86/LDX 86^N Universe, K-Frame and K2 Dyno Universe families — provides unmatched storytelling flexibility, with the ability to easily switch between HD, 4K and 6X with a convenient eLicense.

With Grass Valley 4K UHD production and post solutions, you can shoot and produce 4K UHD today — or be ready for tomorrow — as easily as you do HD, with solutions that take your images from camera to switcher to router to storage. You also have the ability to switch between HD and 4K UHD formats for the ultimate in flexibility.

You can even leverage the quality of 4K in today's HD productions. With the K2 Dyno Universe Replay System's DynoZoom capability, you can shoot replays in 4K UHD, and zoom in up to 400% and still deliver an HD image, with the ability to pan within the 4K UHD image.

Our K-Frame-driven switcher solutions, regardless of panel type (Kayenne, Karrera or GV Korona), are all capable of 4K UHD, HD and HDR.

4K UHD Infrastructure

Grass Valley 4K UHD products provide a variety of ways to work with 4K UHD content, using both SDI-based and IP-based transport schemes.
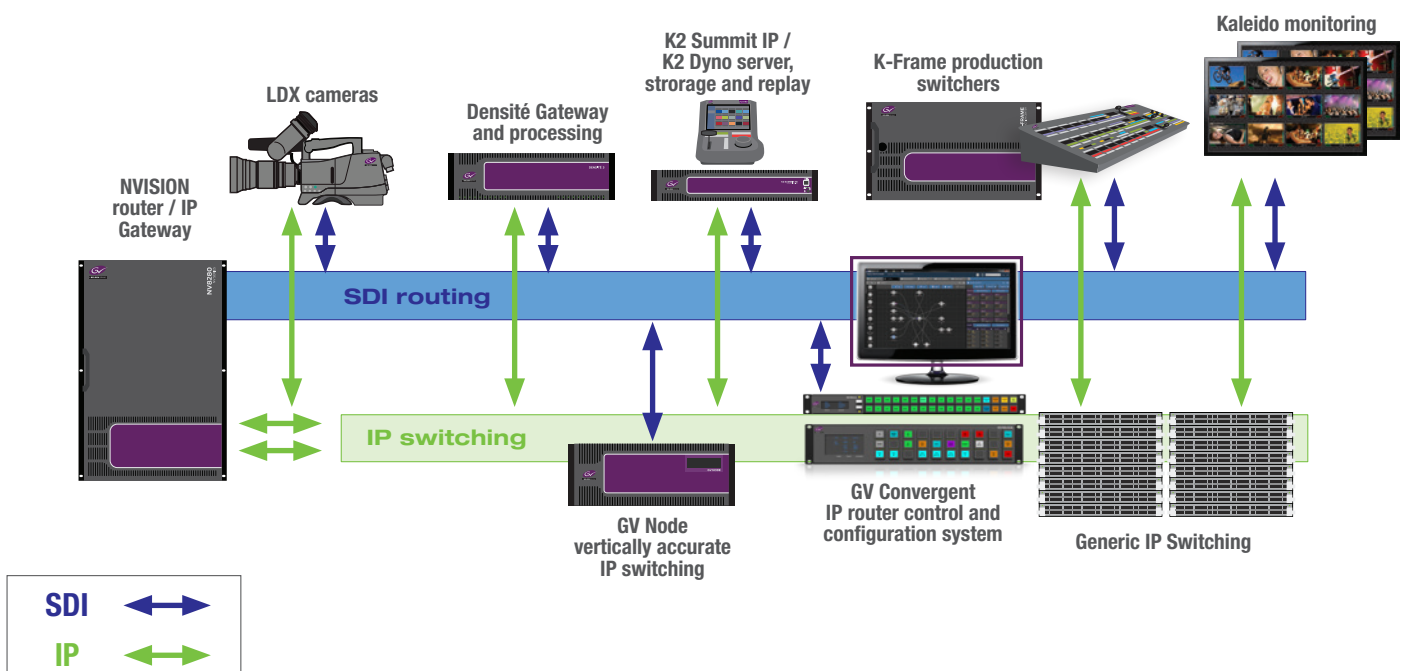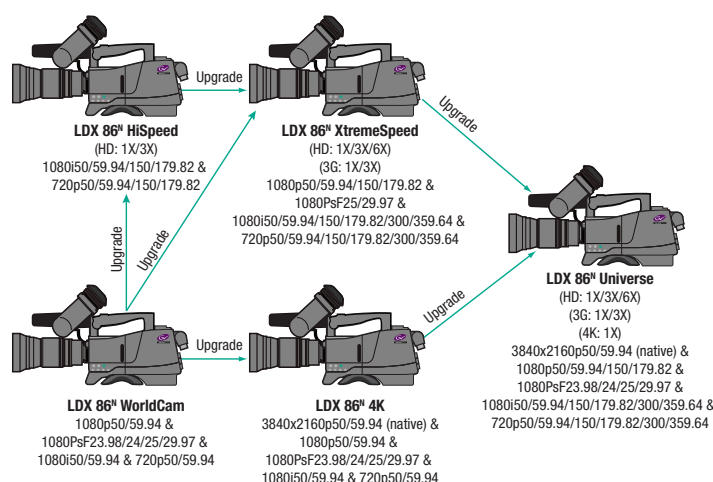
4K UHD

AIMS

IP

TICO

LDX 86^N & XCU HD/4K UHD XF IP Base Station

Grass Valley's flagship **LDX 86^N** Series is the latest addition to the LDX Series, delivering native HD, 3G and 4K UHD images for the highest possible resolution and image clarity. The LDX 86^N Series lets you grow into the formats you need tomorrow while buying only what you need today. With a daily, weekly or perpetual GV-eLicense upgrade path, you can move from any single speed HD/3G format to 4K UHD — from 3X HD speed to 6X HD/3X 3G speed — and even a camera that can switch between higher resolution and higher frame rate. The LDX 86^N Series offers native acquisition for both 4K 3840x2160 and HD 1920x1080 (by combining two horizontal and two vertical adjacent pixels in the 4K UHD imager).

LDX 86^N HiSpeed
(HD: 1X/3X)
1080i50/59.94/150/179.82 &
720p50/59.94/150/179.82

LDX 86^N XtremeSpeed
(HD: 1X/3X/6X)
(3G: 1X/3X)
1080p50/59.94/150/179.82 &
1080PsF25/29.97 &
1080i50/59.94/150/179.82/300/359.64 &
720p50/59.94/150/179.82/300/359.64

Upgrade

LDX 86^N Universe
(HD: 1X/3X/6X)
(3G: 1X/3X)
(4K: 1X)
3840x2160p50/59.94 (native) &
1080p50/59.94/150/179.82 &
1080PsF23.98/24/25/29.97 &
1080i50/59.94/150/179.82/300/359.64 &
720p50/59.94/150/179.82/300/359.64

LDX 86^N WorldCam
1080p50/59.94 &
1080PsF23.98/24/25/29.97 &
1080i50/59.94 & 720p50/59.94

LDX 86^N 4K
3840x2160p50/59.94 (native) &
1080p50/59.94 &
1080PsF23.98/24/25/29.97 &
1080i50/59.94 & 720p50/59.94

Upgrade

☑ Key Features

- Native in the LDX 86^N Series with a new generation of native 4K Xensium_HAWK CMOS imagers that support full native 4K UHD resolution as well as native HD resolution.
- 4K Xensium_HAWK CMOS imagers use a true 16:9 aspect ratio with a native 3840x2160p UHD pixel count, so lenses perform as intended for all broadcast applications.
- The five models in the LDX 86^N Series follow the same familiar daily, weekly or perpetual GV-eLicense upgrade path as the LDX 86 Series, culminating in the LDX 86^N Universe with all native format acquisition for 1920x1080 and 3840x2160 with a simple menu command allowing you to switch between 4K UHD (1X speed), 3G (1X/3X speeds) and HD (1X/3X/6X speeds), complete with standard 1X HD outputs for simultaneous live use.

★ Benefits

- Tell better stories with outstanding image performance even in the most demanding production environments, using HD, 4K UHD, HDR or high frame rates.
- Exceptional flexibility across production formats maximizes camera utilization.
- Rapid and highly flexible connectivity with the unique, dockable XCU base stations (LDX Series).
- Easy migration to IP using uncompressed SMPTE ST 2022-6 or 4K UHD 1-Wire TICO compressed IP.

K-Frame-based Video Production Centers

Any panel, any frame.

Modular. Powerful. Scalable. Grass Valley production switchers reduce the complexity of today's production workloads while providing the flexibility you need to meet tomorrow's demands, all with the creative tools you expect from a Grass Valley switcher.

Our newest control panels, the 1 M/E and 2 M/E **GV Korona** bring legendary Grass Valley production power to small and mid-sized studios and trucks. We've addressed space restrictions by innovating, not stripping out functionality. GV Korona integrates the touchscreen menu into the panel itself, and adds another touchscreen within the transition area to allow TDs quick access to commonly used functions that used to have dedicated buttons.

The Karrera panel, coupled with the standard K-Frame, provides four M/Es in 4K UHD for both 2-sample interleave (2SI) and quad-split SDI. You can use 4K UHD over 1-wire TICO-compressed IP connectivity for greater scalability, as well as less cabling and faster installation, and we also support 12G-SDI.

Every K-Frame, including the S-series, can be transitioned from HD to 3G to 4K UHD by software ensuring that your switcher maintains its value but doesn't strain your CapEx budget.

And *every* Grass Valley switcher control surface can operate with any Grass Valley K-Frame processing engine, giving you the ability to switch today's productions on a panel that meets your budget and production needs today, with options for tomorrow — without having to replace either switcher component.

☑ Key Features

- Highly scalable, flexible SD/HD/3G/4K UHD performance.
- 4 M/Es in 4K UHD mode (both quad-split SDI *and* 2SI).
- Uncompressed SMPTE ST 2022-6 and 4K UHD 1-Wire TICO compressed IP connectivity.
- Licensable M/Es, floating DPMs, chromakeys and other software-enabled functionality.
- Mix and match any Grass Valley panel with any K-Frame
- K-Frame offers the largest I/O footprint on the market

★ Benefits

- Extreme flexibility of switcher allows easy system re-configuration as requirements change.
- Simplified migration to IP using mixed IP and SDI infrastructures.
- Streamlined operational workflow, across all the key stages from show preparation to on-air, and then preparing for the next event.
- Large base of freelance TDs familiar with all Grass Valley production switcher systems.
- Move an entire show file on a thumb drive between different panel/frame configurations.

4K UHD

AIMS

IP

TICO

K2 Dyno Universe Replay System

Optimized for 4K UHD, the 36-channel **K2 Dyno Universe Replay System** gives each operator up to four video angles to choose from, instead of being limited to just one or two angles as with traditional replay systems. All recordings, highlight clips, and playlists can be instantly accessed across the 10 Gb copper network.

AnySpeed allows operators to quickly and smoothly move to the action replay, and then slow down to highlight the details, while avoiding excessively long replay times, with the smoothest playback at any speed from 0% to 200%.

K2 Summit IP is a high-performance server/client for SMPTE ST 2022-6 video-over-IP and SDI playout. This makes it ideal for facilities with an immediate requirement for IP connectivity, or a desire to migrate to IP in the future. K2 Summit IP integrates seamlessly with other Grass Valley IP-enabled products, as well as other SMPTE ST 2022-6 compatible devices.
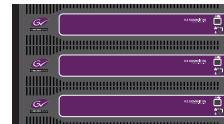
K2 Dyno Universe Scalability

Possible 4K UHD 4 RU Configurations
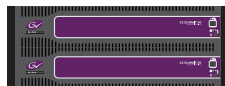
Inputs	K2 Dyno Units	Outputs
4	0	0
2	1	2
0	2	4

Possible 4K UHD 6 RU Configurations

Inputs	K2 Dyno Units	Outputs
6	0	0
4	1	2
2	2	4
0	3	6

✓ Key Features

- Largest number of 4K UHD sources under a single controller (typically 4-in/2-out).
- Largest number of HD sources — both 1X and 6X — under a single controller.
- Integrated pan/zoom in the control surface.

★ Benefits

- Identical operational workflow for 4K UHD as for HD.
- Less rack space required compared with competition — 2-in/2-out configuration is 4 RU, compared with 6 RU.
- No external PC required for pan/zoom.

4K UHD/IP Kaleido Multiviewers

4K UHD

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Grass Valley's **Kaleido** family of multiviewers offers the finest picture quality and layout flexibility across SDI and IP. The range spans the full breadth of multiviewing capabilities, from affordable quad-splits to the very largest enterprise scale monitoring systems.

The **KMX-4911**, the latest Kaleido multiviewer, comes fully integrated into the GV Node Real Time IP Processing and Routing Platform. This offers new possibilities for live production and playout monitoring systems with SMPTE ST 2022-6, TICO and 4K UHD inputs from GV Node with 4K UHD display outputs for live productions.

The **Kaleido-MX 4K** Ultra High-Definition Multiviewer offers stunningly beautiful monitoring of SDI using 4K UHD screens (without visible quadrants), and it's ideal for the most demanding monitoring applications. Available in four configurations for up to 64 SD/HD or 3G inputs, the Kaleido-MX 4K is perfect for high-end in-studio TV productions, outside broadcast trucks, as well as playout facilities.

The **Kaleido-IP** Video Multiviewer offers the most simultaneous video and audio program decodes in the industry, including MPEG-2, MPEG-4 part 2 (H.263) and part 10 (H.264/AVC), HE-AAC v1 & v2, AAC, DD 2.0, DD 5.1 and DD+.

Possessing superior layout flexibility and remarkably easy to use, Kaleido-IP monitors local and remote DVB IP streams, either in single or multiprogram transport stream formats , as well as OTT streams such as HLS. Unique cluster feature supports combining of multiple units to support the very largest monitoring requirements.

☑ Key Features

- Multiviewer range offers unmatched multiviewer picture quality and layout flexibility for the most critical monitoring applications and high-end production requirements.
- Range offers monitoring of SDI and IP, including SMPTE ST 2022-6 uncompressed and compressed IP.
- Kaleido-MX 4K offers stunningly beautiful pictures for monitoring on large 4K UHD screens.
- Mix and match Kaleido multiviewers to create a seamless monitoring system across a facility.
- Rich integration with NVISION router family/third-party routers and production switchers for tally and label/alias source management.

★ Benefits

- Fast low latency processing to keep audio to video delay to a minimum in live production environments.
- High density to save space and weight in OB vans and mobile broadcast.
- Ensure on-air signal quality and compliance, with advanced probing features.
- Virtually limitless multiviewer system expansion using COTS IP and GV Node.

IP Gateways

4K UHD

AIMS

IP

TICO

Densité IPG-3901 SDI/IP Gateway Cards

Densité IP Gateway (IPG-3901) plug-and-play modules seamlessly bridge hybrid SDI/IP production environments. As broadcasters migrate to IP-based transport, these space-saving, low-power cards are easily added to existing Densité signal processing platforms, converting real-time, uncompressed, baseband video using SMPTE ST 2022-6 protocol for distribution over 10 GigE networks, and vice versa.
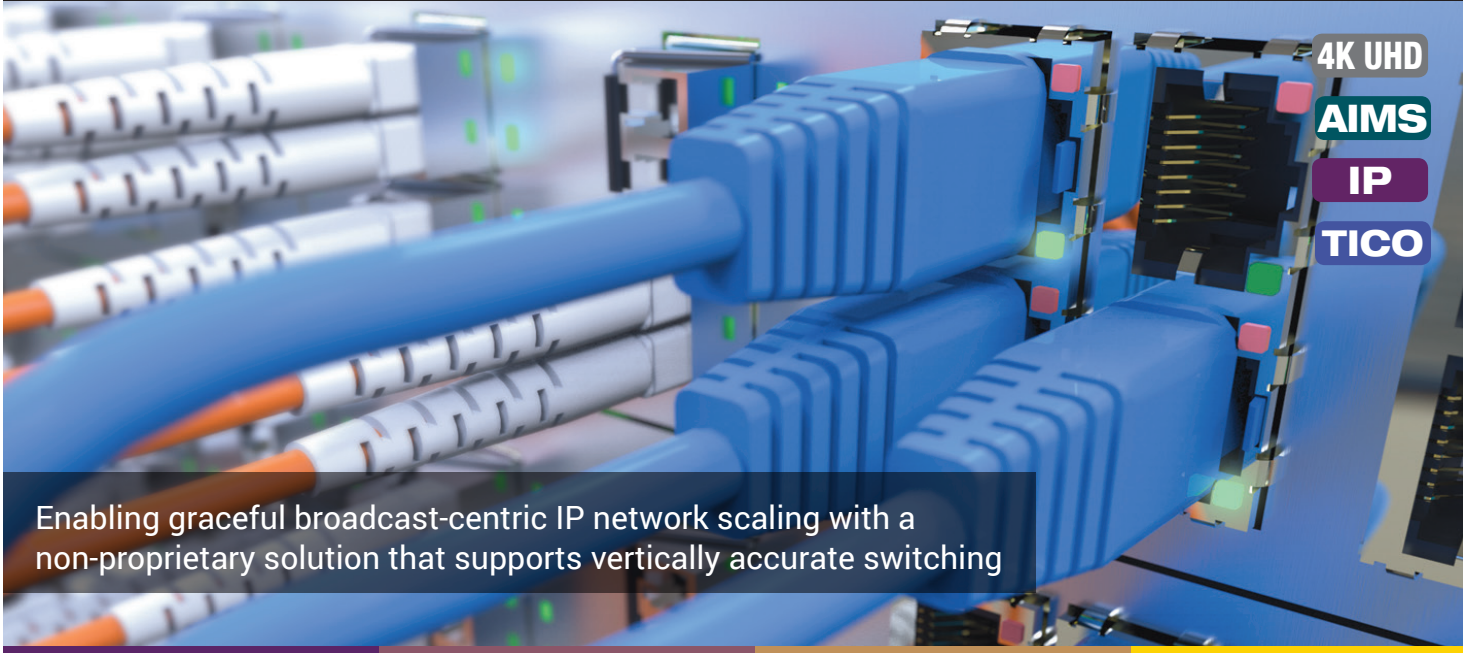
The gateways support any mix of 3G/HD/SD-SDI production workflows over IP networks. With bidirectional I/O in combinations of 5 in/6 out or 6 in/5 out, the cards offer full redundancy in either unicast or multicast workflows to ensure uninterrupted service.

The IPG-3901 with purchasable TICO option provides either two (2) encodes *OR* two (2) decodes *OR* one (1) encode and one (1) decode per card.

☑ Key Features

- High density configuration:
  - Up to 11 gateways per card/66 HD/33 3G gateways per RU in redundancy mode.
  - Up to 66 3G gateways per RU in aggregation mode.
- De-encapsulate full bandwidth uncompressed SMPTE ST 2022-6 to SDI.
- Encapsulate SDI into full bandwidth uncompressed SMPTE ST 2022-6 IP.
- Bidirectional transport of SD/HD/3G-SDI video signal over 10 GigE link.
- Full 1+1 stream redundancy with automatic change-over link to avoid service interruption.
- New aggregation mode that provides a total IP bandwidth of 20 GigE, providing higher 3G transmission capability per IPG card such as the transfer of 4K UHD uncompressed over a 4K UHD link on a single IPG.
- Bidirectional I/O for 2 inputs, 2 outputs and 7 bidirectional I/Os for up to 11 streams.
- Flexible SD/URS reference input

- Compatible with Densité 3, 3+ and GV Node platforms.
- Integrates with iControl and GV Convergent SDN control frameworks.
- IGMPv3 support for IP inputs.
- Supports unicast and multicast signals..
- Features dual-network interfaces supporting 10 GigE SFP+:
  - Short range multi-mode optical.
  - Long range single-mode optical.
- TICO 4K UHD 1-wire option:
  - IPG-3901-OPT-TICO — this is a purchasable option that gives dual TICO codec option for 4K UHD 1-wire support.
  - 2SI/SDQS 4K UHD link I/O support as per SMPTE ST 425-5.
  - Simultaneous HD and 4K UHD.
  - TICO is intoPIX Profile 1 with visually lossless 4:1 low-latency compression.
  - Flexible configuration of 2 encoder or 2 decoder or 1 encoder and 1 decoder.
  - 3G monitoring of 4K UHD signals.

Broadcast Data Center

Enabling graceful broadcast-centric IP network scaling with a non-proprietary solution that supports vertically accurate switching

4K UHD

AIMS

IP

TICO

A typical IP Data Center provides a number of key advantages: they are scalable, easily upgradable, provide flexible processing ability and are gracefully fault tolerant. It's easy to see the benefits of emulating this type of infrastructure, especially as new formats are quickly introduced into the viewing marketplace. In an IP Data Center, SD, HD, 3G, 4K UHD, 8K UHD and whatever else is on the horizon are easily handled — as far as bandwidth is concerned.

But as a broadcaster, you need more. Our world, while based on the same digital ones and zeros, is a real-time processing and routing world, where delays and switches outside of frame boundaries can be disruptive, even devastating. You require vertically accurate switching, extremely low latency and, most important, the ability to process video the same way you do today in the SDI world. That's why a **Broadcast Data Center**, with its broadcast-centric design, provides exactly what you need for your migration to IP production and infrastructure design.

IP Data Center vs Broadcast Data Center

Process	IP Data Center	Broadcast Data Center
Agility of Service Deployment	✔	✔
Scalability (ease of upgrading)	✔	✔
Non-Blocking	✔	✔
Graceful Fault Tolerance	✔	✔
Ease of Upgrade	✔	✔
High Bandwidth (uncompressed video)	✔	✔
Format Agnostic	✔	✔
Vertically Accurate Video-over-IP Switching (edge- or destination-based)	�’	✔
Quiet Audio Switching	✗	✔
Native SDI Connections Supported	✗	✔
Low Latency (less than 1 video frame)	▲	✔
Computational Intensity for Encoding (i.e., HEVC)	▲	✔
Programmable FPGA Blades	✗	✔

Grass Valley's Broadcast Data Center delivers an agile IP-based infrastructure capable of meeting the performance needs of broadcasters.

IP/SDI Router Control & Configuration

4K UHD

AIMS

IP

TICO

GV Convergent

The **GV Convergent** IP Router Control & Configuration System transparently manages facility routing as the industry migrates from SDI to IP infrastructures, maintaining familiar control interfaces as well as introducing intuitive new GUIs for configuration, management and control. GV Convergent is both infrastructure and signal format agnostic for easy scalability for your system today and far into the future.

The control system is an intuitive, graphically-oriented control system, designed to work transparently across SDI and IP workflows, including commercial-off-the-shelf (COTS) IP switches. GV Convergent offers control of hybrid IP/baseband routing environments, spanning baseband routers and COTS IP switches.

GV Convergent makes an IP infrastructure perform similar to an SDI router with respect to setting crosspoints and managing signal bandwidth allocation at the edge of the network, thereby assisting integration of an IP infrastructure into a familiar SDI workflow. GV Convergent will make routing IP video and audio appear the same as routing SDI to an operator. In essence, it allows an SDI/IP switching infrastructure to look like a single homogeneous switching system.

☑ Key Features

Transparent management of SDI and IP infrastructures

- GV Convergent works with commercial-off-the-shelf (COTS) switches.
- GV Convergent controls GV Node Real Time IP Processing and Routing Platform and SDI routers.
- Supports industry audio/video-over-IP standards, including SMPTE ST 2022-6, and works transparently in a hybrid world of both SDI and IP.
- Provides multiple, simultaneous, administrator data entry points, which are very useful in dynamic environments such as trucks.

Mission-critical and scalable architecture

- Completely integrated configuration and distributed control environment allows easy and dynamic sharing of configurations and data, enabling scalability from small to very large facilities handling thousands of I/Os.
- Distributed services provide robust and efficient redundancy, leading to zero downtime and glitch-free failover impact.

★ Benefits

- Hide network complexity from your operators.
- One intuitive common and familiar interface for your SDI and IP workflows.
- Add IP to your facility, maintaining familiar interfaces and workflows, eliminating re-training.
- No need to forklift SDI infrastructures in order to benefit from IP — they can work together.

4K UHD
AIMS
IP
TICO

GV Node

Up until now, there has not been an IP processing and routing node designed for live production in broadcast that can offer vertically accurate switching along with other signal processing and routing capabilities. With the introduction of **GV Node**, commercial-off-the-shelf (COTS) IP switches can be used in broadcast and media facilities with the assurance that these switches offer transparent broadcast-centric operation and processing.

GV Node is the first true, Real Time IP Processing and Routing Platform designed to handle deterministic vertically accurate switching within IP. It supports SMPTE ST 2022-6 IP inputs and outputs, as well as TICO visually lossless compression for 4K UHD applications, and is the first component of Grass Valley's groundbreaking **Broadcast Data Center**. For full broadcast capabilities, GV Node also supports the extensive range of **Densité** signal processing modules along with a fully integrated and highly scalable Kaleido multiviewer to deliver the highest quality monitoring with the most flexible layout available.

The most important differentiators of GV Node to other proprietary and/or COTS IP switching solutions available to broadcasters are its vertically accurate, deterministic switching and quiet audio switching capabilities. These are critical because broadcasters have valid concerns about the effectiveness of COTS IP switches for some live applications, due to their inability to perform switching in the vertical interval or the ability to V-fade audio like traditional SDI routers. These abilities are especially important in live applications where signals go directly to air, and where routers have traditionally been used as a backup to the production switcher. Vertically accurate switching and quiet audio switching are also needed when a router is used for providing secondary live feeds.

☑ Key Features

- Provides vertically accurate switching and IP aggregation of up to 144x14 per node.
- Nearly limitless scalability based on IP network bandwidth, up to 15000x15000+ using Cisco Nexus 9272Q Leaf and Spine.
- Quiet audio switching of 2304x2304 audio channel.
- Small 4 RU footprint with up to 16 I/O processing modules, typically requiring 40 percent less rack space than competitive systems with comparable weight reduction.
- Industry proven built-in Kaleido multiviewer for high-quality picture and graphics monitoring.
- Support for SMPTE ST 2022-6 and TICO compression.
- Highly distributed topology, based on "spine-leaf" architecture that's typical of modern IT infrastructures.
- 1 TB of IP bandwidth for signal aggregation.

★ Benefits

- High level of functional integration across IP switching, IP/SDI gateway, audio processing and multiviewing.
- Functional integration provides superior performance delivering reduced delay, fewer components and a better user experience.
- Signal processing (MADI I/O, audio de-embedding/embedding, and monitoring including multiviewing and signal probing).
- IP/SDI flexibility to handle a gradual or full migration to IP.
- Simplify routing and reduce cabling.
- Make IP switching a reality in live productions.
- Fully integrated 9x2 Kaleido multiviewer module, expandable to 36x4.
- Supports 36x36 channels of uncompressed 4K.

Cisco Switch

4K UHD

AIMS

IP

TICO

COTS-Based IP Switch

Cisco Nexus 9200 Series Switch

The Cisco Nexus 9200 series switches utilise Cisco's "non-blocking multicast" (NBM) algorithm, which is specifically designed for professional media network solutions. There are three models. Which one to use depends on the particular network configuration:

Nexus 9272Q — 72 x 40 Gb ports, although only 35 breakout ports are required by GV Node.

Nexus 9236C — 36 x 40/100 Gb ports — all of which are broken out to 4 x 10 Gb.

Some designs using IPGs can use the **Nexus 92160YC-X** as an alternative.

⭐ **Benefits**

Programmability

- Open APIs to manage the switch through remote-procedure calls (JavaScript Object Notation [JSON] or XML) over HTTP or HTTPS.
- Automated configuration through Linux shell scripts.
- Support for customer applications through a Linux container environment.
- Support for Puppet, Chef, and Ansible.

Scalability

- Wire-rate Layer 2 and 3 switching on all ports with up to 144 1/10 Gb ports for host connectivity.
- Line-rate virtual extensible LAN (VXLAN) bridging and routing.
- Border Gateway Protocol Ethernet VPN (BGP EVPN) control plane for scalable multitenancy and host mobility.
- Segment routing for increased network scalability and virtualisation.

Operational Efficiency and Traffic Monitoring

- Nexus Fabric Manager support to automate fabric configuration and management.
- Advanced reboot capabilities include hot and cold patching capabilities.
- Power-on autoprovisioning (POAP) and Preboot Execution. Environment (PXE) provide touchless switch bootup and configuration to drastically reduce provisioning time.
- Real-time buffer utilization per port and per queue to monitor traffic bursts and application traffic patterns.
- Cisco Nexus Data Broker support for network traffic monitoring and analysis.

Effectively including servers, storage and media I/O within a complete live, playout or news solution depends on meeting specific workflow and media infrastructure needs. This includes configuring the individual products to function as a solution; integrating with third-party control, management, operations and business systems; and meeting the bandwidth, transfer and format flexibility requirements of today's complex media environments. Grass Valley Global Services provides the expertise and experience to help media professionals define requirements, design solutions and implement world-class, file-based facilities.
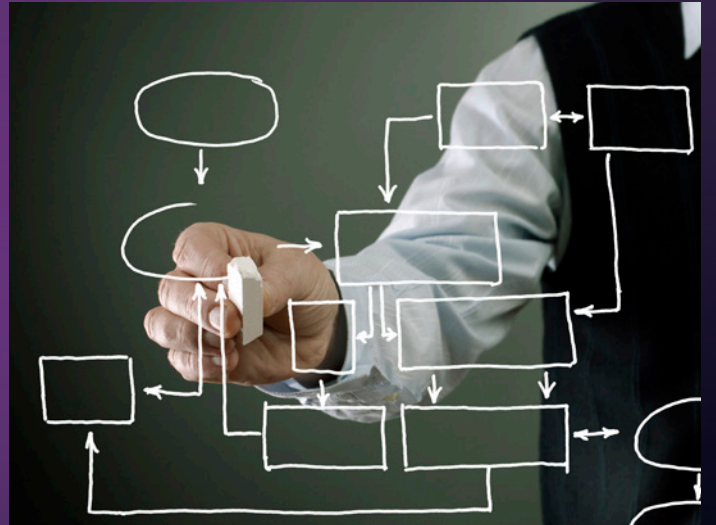
Professional Services

System functionality and performance tuning requires understanding user requirements. The ability to specify technical needs, required interfaces, bandwidth and workflow needs requires an in-depth knowledge of both the technology and the environment. Grass Valley Professional Services includes systems engineers with among the world's highest level of expertise. However, project success requires more than technical knowledge. To complete the picture, Grass Valley provides expert project management to capture specifications, plan resources, schedule and budget. The combined professional services team has the competencies and experience to insure a successful implementation.

Commissioning

Grass Valley insures the best use of K2-based systems by personally handing the initial setup and commissioning. Field engineers have the experience, knowledge and skills necessary to bring a variety of systems to life — both as product sets, and in the broader context of complete solutions.

Training

Operational and technical training set the foundation for success. Our trainers are experienced in broadcast and in the operational and technical nuances of different K2-based deployments. On-site training is available to bring users up to speed as quickly as possible.

Support Agreements

Uptime, risk and financial predictability are the hidden variables in total cost of ownership. The ability to manage these is what makes support agreements cost-effective tools for business optimization. Recording, playback and playout equal revenue: downtime, missed commercial spots, slow performance and playout errors have severe financial impacts. Elite Support Agreements are designed for these critical environments where very high uptime and quick problem resolution is required. They provide 24x7 technical phone support, call centre prioritization, service level objectives, software updates/upgrades and advance parts exchange. Elite Support Agreements insure that users have both operational efficiency and financial predictability.

☑ Global Services Provides

• Complete set of services:
  – Strategic advice.
  – System architecture.
  – Workflow analysis and design.
  – Project management.
  – Integration and implementation.
  – Performance optimization.
  – Technical and operational training.
  – Educational services.

★ Contact Grass Valley

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Locate a Grass Valley office at: www.grassvalley.com/sales/offices

Arena TV and Grass Valley

World's First All-IP, 4K UHD OB Fleet

Background

Arena is a UK-based production company that holds contracts with the nation's major broadcasters to provide coverage of events, music, large studio shows and sport. Arena is a Telegraph 1000 business that has remained in continuous family ownership for approaching 30 years.

www.arena-tv-com

Challenge

A company that takes pride in innovation, Arena's latest project has perhaps been their most ambitious to date — to create the world's first all-IP, UHD OB fleet. Their specific requirements were as follows:
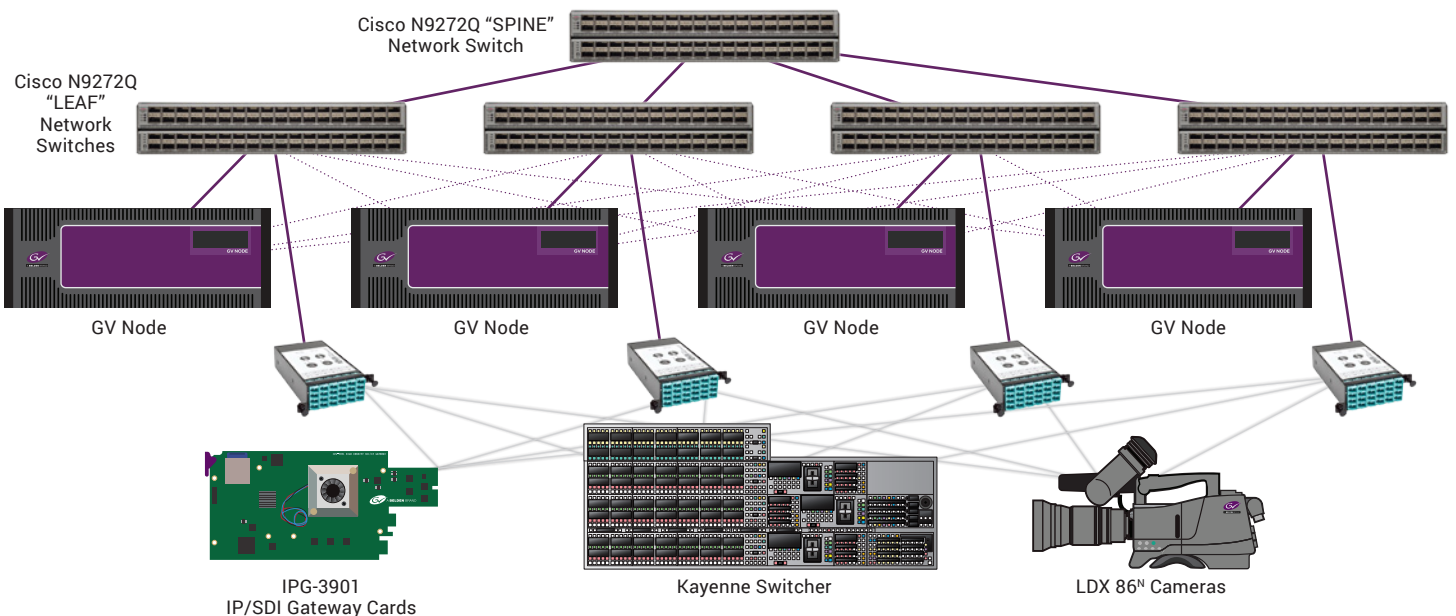
- Commercial, off-the-shelf (COTS)-based infrastructure — Cisco, Arista, Juniper or HP

- Standards-based – SMPTE ST 2022-6, AES 67, TR04 and TR03 (SMPTE ST 2110)
- Signal agnostic — 4K UHD 2160p50, 3G 1080p50 and HD 1080i50
- Future-ready — HDR (High Dynamic Range) and HFR (High Frame Rate)
- Reduction in cabling – for lighter payload and easier access to equipment
- Cost neutral to an equivalent Quad-SDI based solution

Solution

Grass Valley and Arena, with technology partner Cisco, designed a network topology using a spine and leaf configuration, based around a 2.88 Tb/s Nexus switch.

Spine and Leaf Topology

Cisco N9272Q "SPINE" Network Switch

Cisco N9272Q "LEAF" Network Switches

GV Node   GV Node   GV Node   GV Node

IPG-3901 IP/SDI Gateway Cards

Kayenne Switcher

LDX 86^N Cameras

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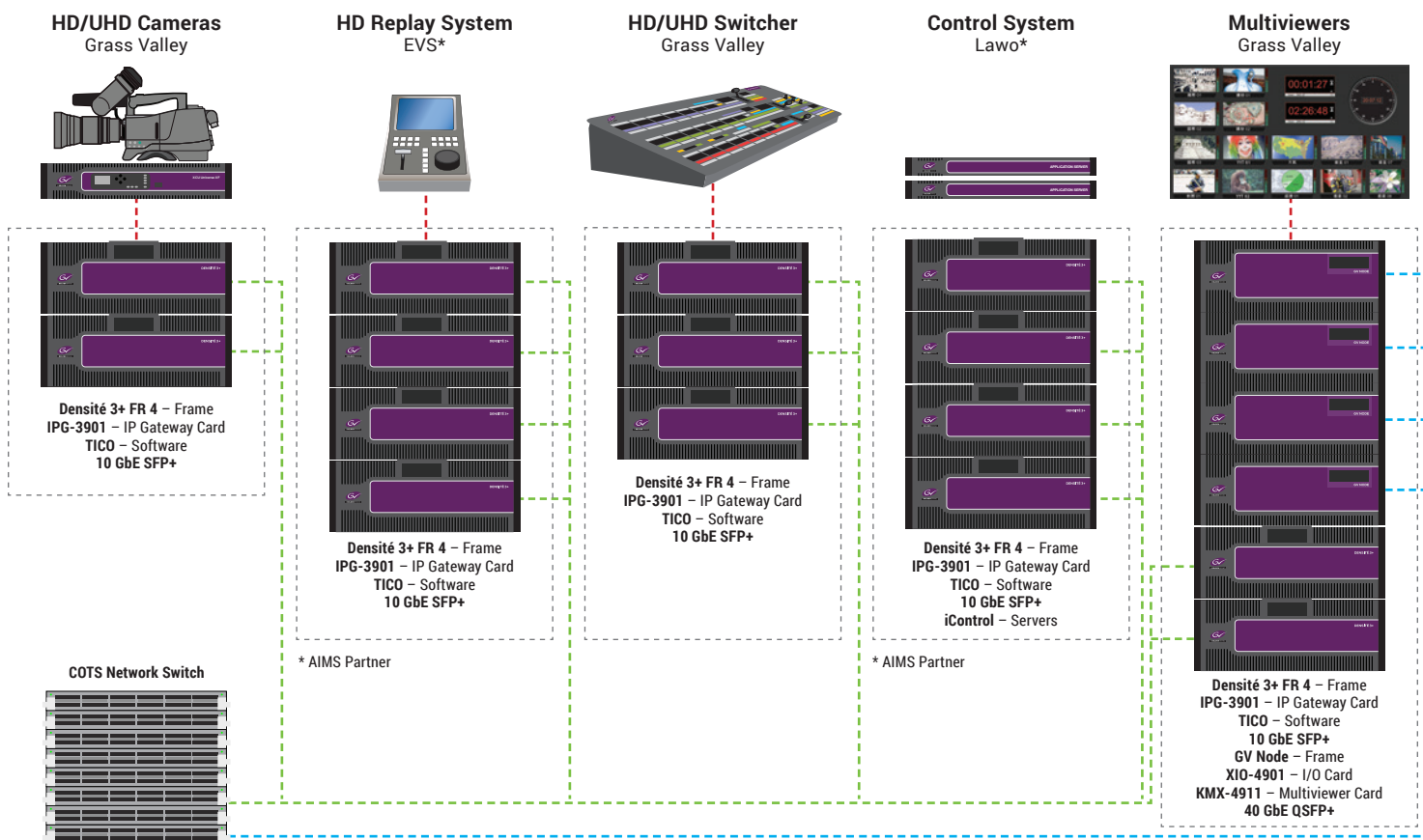

4K UHD/3G/HD & IP at Work Today

☑ Grass Valley Equipment

- LDX86^N cameras
- Kayenne switcher with Standard K-Frame (4 M/E 4K UHD enabled)
- IPG-3901 IP/SDI gateway cards
- GV Nodes fitted with KMX-4911 multiviewer cards
- iControl Appliance Server (RESTful API)

★ Benefits

- OBX is completely flexible, format-wise, and can be configured for 4K UHD, 3G, HD, even SD, without the need to re-cable.
- Lighter payload compared with Quad-SDI solutions, and equipment can be distributed more evenly around the OB truck (unlike a conventional SDI router).

System Overview

HD/UHD Cameras	HD Replay System	HD/UHD Switcher	Control System	Multiviewers
Grass Valley	EVS*	Grass Valley	Lawo*	Grass Valley

Densité 3+ FR 4 – Frame
IPG-3901 – IP Gateway Card
TICO – Software
10 GbE SFP+

Densité 3+ FR 4 – Frame
IPG-3901 – IP Gateway Card
TICO – Software
10 GbE SFP+

Densité 3+ FR 4 – Frame
IPG-3901 – IP Gateway Card
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10 GbE SFP+

Densité 3+ FR 4 – Frame
IPG-3901 – IP Gateway Card
TICO – Software
10 GbE SFP+
iControl – Servers

Densité 3+ FR 4 – Frame
IPG-3901 – IP Gateway Card
TICO – Software
10 GbE SFP+
GV Node – Frame
XIO-4901 – I/O Card
KMX-4911 – Multiviewer Card
40 GbE QSFP+

COTS Network Switch

* AIMS Partner

* AIMS Partner

Live Production
Roadshow 2016/2017

Hilversum, Netherlands — *November 2nd, 2016*

London, UK — *November 8th, 2016*

Moscow, Russia — *November 16-18th, 2016*
(NATEXPO)

Dubai, UAE — *November 29th, 2016*

Riyadh, Saudi Arabia — *January 11th, 2017*

Paris, France — *January 18th, 2017*

Milan, Italy — *January 26th, 2017*

Madrid, Spain — *February 1st, 2017*

Cologne, Germany — *February 14th, 2017*

Munich, Germany — *February 16th, 2017*

GVB-1-0612A-UK-GV