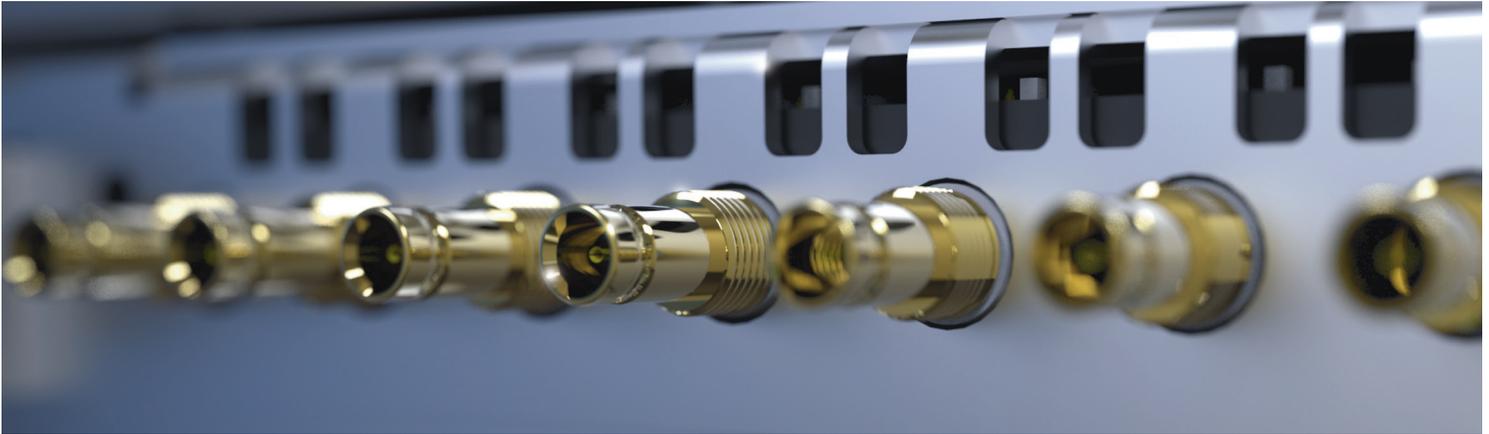


## K2

### 4K/3G/HD/SD Media Server & Storage Platform



The K2 media server and storage platform from Grass Valley, a Belden Brand, is the most extensive and flexible line of media servers, storage and integrated playout devices in the industry. Leveraging open-standard IT components and technologies, the K2 platform brings the benefits of mainstream computer industries to the broadcast enterprise — including the latest advances in processing power and storage capacity with ease of integration, and streamlined operation and management, for formats ranging from SD to 4K.

#### **K2 Summit 3G Production Client**

#### **K2 Summit IP Client**

#### **K2 Solo 3G**

#### **K2 Summit 3G Transmission Client**

#### **K2 Central TX**

#### **K2 10G Shared Storage**

K2 systems can be deployed in a variety of configurations depending on user requirements. Systems are scalable for more channels, bandwidth and storage capacity. Systems can be designed with various levels of redundancy.

The K2 platform's open storage architecture easily integrates with Grass Valley and many third-party products and applications. Its file system is compatible with QuickTime and MXF to enable easy integration with NLEs, including Grass Valley EDIUS and popular third-party solutions including Apple Final Cut Pro, Adobe Premiere Pro CC and Avid Media Composer/NewsCutter. The open file system provides interoperability with archive and other smart appliances via industry-standard formats including MXF, QuickTime and GXF.

Crucial to a file-based infrastructure is bandwidth. The K2 platform has the highest bandwidth capability of any system in the industry, and is proven at the largest real-world system installations. Equally important, the K2 platform features a Quality of Service algorithm with dynamic allocation of bandwidth where it's needed, guaranteeing that on-air channels never drop a frame of video. High-bandwidth FTP capabilities permit the K2 platform to adapt to a wide variety of workflows.

With hundreds of K2 installations around the world, it is a solution proven in many 24/7/365 mission-critical environments including ingest, playout, news and live event production.

# K2 Summit 3G Production Client

The **K2 Summit 3G Production Client** is optimized for a broad range of production and broadcast applications and is the only server that supports end-to-end SD/HD/3G/4K workflows in DVCPRO, MPEG-2, AVC-Intra, H.264/AVCHD and DNxHD formats.

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**T**he Grass Valley K2 Summit 3G Production Client is a major enhancement to the K2 media server family. It is optimized for production, live event workflows and broadcast applications. Teamed with the K2 Dyno Replay Controller and the GV STRATUS Video Production and Content Management Toolset, K2 Summit 3G offers an ideal solution for live events such as sports and concerts, studio production, news and any application that requires quick access to recorded media. A K2 Summit 3G Production Client can be configured as part of a SAN solution comprised of multiple K2 Summit clients, K2 media servers and K2 RAID storage — or deploy a standalone K2 Summit system with internal or external storage for use in a distributed environment. Both the SAN and standalone systems are optimized to work in a file-based environment.

## K2 Platform – Overview

The K2 platform is comprised of one or more K2 Summit SAN-attached clients connected to one or more K2 media servers and K2 RAID-protected storage. The K2 Summit client performs all video and audio I/O using built-in encoders and decoders. More than 100 channels can be attached to the K2 media servers and RAID system. For its part, the K2 media server manages the file system and controls file transfer protocol (FTP) operations. K2 storage offers options for internal drives or external RAID systems that can scale to more than 50 terabytes.

## K2 Summit 3G Production Client

The K2 Summit 3G Production Client is a 2 RU platform with redundant hot-swappable power supplies, as well as redundant Ethernet ports. It includes an embedded OS that runs off of an mSATA solid state drive (SSD) providing fast and reliable operation. To provide a cost-effective design with no single point of failure, each K2 Summit attached to a SAN offers two iSCSI or Fibre Channel ports to provide a backup data path in case of a failure. To this architecture Grass Valley has added its Emmy® Award-winning core video technology. Each channel is built around a high-performance RISC processor, an embedded real-time operating system, and performs video/audio processing in the robust and secure manner needed for a 24/7, frame-accurate environment.

## K2 Production Features

The K2 Summit 3G Production Client has been specifically designed for the needs of SD/HD/3G/4K live event productions such as sporting events where instant replays need to be available immediately at the push of a button. Highlights, playlists and resources such as record channels from multiple systems can be shared by users. All channels are bidirectional and can easily and quickly switch between record and play.

## ChannelFlex

ChannelFlex doubles the K2 Summit 3G's capability from supporting four video streams to eight video streams in application-specific configurations:

- Record up to 8 camera feeds in DV, XDCAM HD, AVC-Intra or DNxHD formats
- Record up to two 2X/3X super slo-mo cameras in DVCPRO HD, AVC-Intra or DNxHD formats
- Record up to four 3D cameras or video+key pairs: HD in AVC-Intra/SD in IMX30
- Play up to four 3D files or video+key pairs: HD in AVC-Intra/SD in IMX30

## Proxy Encoding

Low-resolution proxy versions of media can be encoded and either streamed over IP networks or stored for use in distributed workflows. This enables extending access to more users to produce content and to remotely monitor playback channels while conserving system resources.

## Flexible Monitoring Options

With the built-in VGA multiviewer, all four channels can be monitored in normal mode or up to eight streams when ChannelFlex\* is in operation. An SDI monitor output is available with time-code burn-in for each channel. A user-definable text overlay option\*\* is available for both monitor displays, enabling various information such as channel/clip name, transport controls, play speed, audio meters and more to be displayed in any location with various text sizes and colors. A truly unique feature allows a streaming proxy of either input or output video and audio to allow monitoring using an IP network and a standard client viewer.

## Built-in Mix Effects

For generating quick highlight packages, often all that is required are simple dissolves or fades between two clips. Each channel has this capability built-in (most servers require two channels to do a mix effect). An integrated mixer dissolves between two clips or to a matte color. The color and transition times are user-definable.

## Multiple Format Capabilities

The K2 Summit 3G Production Client is the only server that provides agile codecs enabling playback of SD, HD, 3G and 4K content seamlessly on the same timeline with any supported format (DV/DVCPRO, MPEG-2, AVC-Intra, H.264 or DNxHD). With seamless and automatic up/down/crossconversion of clips to your desired output resolution, the K2 Summit 3G Production Client provides full support for all SD and HD formats. The K2 Summit 3G Production Client also supports the industry-wide AFD standard for aspect ratio conversion. As a result, you only need to store a single-format version of a clip in order to play it out in the appropriate SD or HD format. The K2 Summit 3G Production Client is capable of simultaneously encoding a low-resolution proxy along with the high-resolution recording to extend workflows to the user's desktop. The K2 Summit 3G Production Client features smooth, high-quality, bidirectional, slow-motion playback and enhanced jog/shuttle control for all formats including MPEG-2 Long GOP. Playback trails recording by a fraction of a second so replay is virtually instantaneous\*\*. Slo-mo playback and freeze frames are jitter-free at even the slowest speeds due to the use of line interpolation technology.

\* Requires AppCenter Pro or Elite.

\*\* Requires AppCenter Elite.

# K2 Summit 3G Production Client

## KEY FEATURES

- Two- or four-channel configurations:
  - SD: DV, IMX and MPEG-2 I-Frame & Long GOP
  - HD: DV, XDCAM HD, XDCAM EX, MPEG-2 I-Frame & Long GOP, DVCPRO HD, AVC-Intra and DNxHD
- Play different formats back-to-back:
  - SD/HD/3G/4K clips
  - 720p/1080i
  - 1080p 3G
  - 2160p 4K
  - DV/MPEG-AVC-Intra/H.264/AVCHD
- Optional low-resolution proxy encoding for streaming monitor and distributed workflows
- Instant replay capability
- ChannelFlex – part of AppCenter Elite:
  - Multicam mode
  - Synchronized multichannel record and play to support two UHD/4K channels
  - Super slo-mo mode
  - 3D mode
  - Video+key mode
  - HD/SD-SDI monitor output with timecode burn-in and custom text overlays
  - Multiviewer monitor mode with custom text overlays
- iSCSI or Fibre Channel connection to K2 SAN shared storage
- Fast boot times with embedded OS on mSATA solid state drive (SSD)
- Option for up to 7.2 TB of internal hard disk storage
- Built-in mix effects on each channel:
  - Video dissolves and audio crossfades supported via APIs and AppCenter Pro playlist
- Import/export all formats as MXF OP1a, SMPTE ST 360 (GXF) or QuickTime
- File system enables edit-in-place of QuickTime files
- Expanded internal storage capacity — 7.2 TB
- Software-based codecs for agile playback and easy configuration
- Increased bandwidth to support more channels, higher bit rates, faster file transfers
- Super slow-motion support in DVCPRO HD, AVC-Intra and DNxHD formats
- Full XDCAM HD workflow support including multicam mode
- 1080p50/60 Level A support using AVC-Intra
- Simultaneous high-resolution and low-resolution “proxy” encoding for recording or streaming
- Embedded operating system on mSATA solid state drive (SSD)
- Automatic up/downconversion, user-definable aspect ratio conversion, and closed caption preservation
- Configurable as SAN or standalone solution
- ANC data preserved and full AFD processing
- Scales from two to four channels to more than 100 channels
- Full multichannel audio support – 16 SDI audio tracks per video channel (32 audio tracks per clip on disk)

## Audio and Closed Caption/Teletext Multilingual Support

Each video channel has up to eight AES/EBU or 16 embedded channels of PCM or compressed audio. For easy track management, each audio track can be identified with a language descriptor\*.

Additional audio features include scrub audio up to 2X, audio meters for each channel, an internal audio delay capability and the ability to adjust levels during recording or playback. It also performs an audio ramp down/ramp up between clips to eliminate audio clicks and/or pops. Additional audio tracks can be imported into a clip\* to easily add additional languages. In addition multiple closed captions or teletext files can be imported from third-party captioning editors for additional language support.

\* Requires AppCenter Pro or Elite.



Rear View K2 Summit 3G Production Client



Internal multiviewer output on VGA provides a display of up to eight channels in real time when used with ChannelFlex.

# K2 Summit 3G Production Client

## SPECIFICATIONS

### Description

2 or 4 SD/HD channels  
All channels are bidirectional

### Video Channels

2 or 4 bidirectional HD/SD-SDI record/ play channels BNC, 75Ω

**SD SDI:** SMPTE ST 259, ITU R601, 525/625 line component, 10-bit

**HD-SDI:** SMPTE ST 292, 10-bit

**HD:** SMPTE ST 424

### Formats

#### SD:

DV, DVCAM, DV25, DV50  
MPEG-2@ML 4:2:0, I-Frame & Long GOP  
2-15 Mb/s  
MPEG-2 @ML 4:2:2, I-Frame & Long GOP  
4-50 Mb/s

#### HD:

MPEG-2@HL 4:2:0, I-Frame & Long GOP 12-100 Mb/s  
MPEG-2 @HL 4:2:2, I-Frame & Long GOP 20-100 Mb/s  
XDCAM HD (18, 25, 35 Mb/s)  
XDCAM HD 4:2:2 (50 Mb/s)  
XDCAM EX  
DVCPRO HD  
AVC-Intra 50/100 (optional)  
AVC-Intra Class 100 1080p50/60 Level A (optional)  
H.264/AVCHD playback (optional)  
DNxHD 115, 120, 145, 175, 185, 222 Mb/s  
720p and 1080i (optional)

### Proxy Encoding

4 or 8 streams (licensed through AppCenter Pro and AppCenter Elite)

Each stream includes 1 video and up to 8 audio tracks for recording

Any audio tracks can be selected when streaming

### Compression:

Video: MPEG-4 part 2  
Audio: AAC

### ChannelFlex Modes (optional)

Multicam (up to 4 channels)  
Super slo-mo (1 or 2 channels)3D (up to 4 channels)  
Video+key (up to 4 channels)

### Audio Special Features

Scrub audio support (±2X)  
Audio click elimination  
Agile playback of clips with different supported audio formats  
Audio tagging and audio mapping (with K2 AppCenter Pro)  
Audio mix effects (PCM only)  
Cross fade between tracks  
Fade up/down

### Power Requirements

Dual redundant 600W maximum, 400W typical  
Auto-sensing, hot-swap  
100-240 VAC, 50-60 Hz

### Monitor Modes

SDI monitor out w/timecode burn-in  
VGA multiviewer – w/definable text overlay for above displays including channel name, clip name, transport status, play speed, audio meters and other status

### Video Playback Output

Any supported format can be played seamlessly back-to-back  
Output can be delayed at pixel resolution within a range of one frame  
Freeze mode: frame or field  
Off-speed play: line interpolation provides jitter free slow-motion playback in both directions

### Video Mix Effects (optional)

Dissolves between two video tracks on same channel  
Fade up/down to matte color (default is black)  
Max duration per transition: user selectable

### Environmental Characteristics

**Operating temperature:** 10° to +40°C (50° to 104°F)

**Non-operating temperature:** -40° to +60°C (-40° to 140°F)

**Operating relative humidity:** 20% to 80% from -5° to +45°C (23° to 113°F)

**Non-operating relative humidity:** 10% to 80% from -30° to +60°C (-22° to 140°F)

### GPI

12 in, 12 out: 25-pin D connector (DB25)

### Dimensions

**Height:** 9 cm (3.5 in.) – 2 RU

**Width:** 44.5 cm (17.5 in.)

**Depth:** 61.6 cm (24.5 in.)

**Weight:** 24 kg (53 lbs.) maximum

### Redundancy

Redundant power supplies (hot-swappable)  
Redundant cooling

### Up/Down/Cross Conversion and Aspect Ratio

525 to 1080i, 525 to 720p, 625 to 1080i, 625 to 720p  
720p to 1080i cross conversion

AFD support for 4:3 to 16:9 aspect ratio conversion with format specified on a channel basis with clip-by-clip override capability

Bar, half-bar, crop and stretch options configurable via UI, AMP protocol or K2.net

### E-to-E Mode

Less than one frame delay  
No re-timing applied

### Audio

Record or play up to 16 tracks per channel  
32 audio tracks per clip stored on disk

### Embedded Audio Tracks

16 tracks embedded, per video channel

### Reference Genlock

NTSC/PAL black composite analog  
Two BNC, 75Ω passive loop through  
Burst frequency lock: PAL, +10 Hz at subcarrier  
NTSC, +20 Hz at subcarrier  
Tri-Level sync conforms to SMPTE ST 296 for 1280x720P systems and SMPTE ST 274 for 1920x1080

### Timecode

LTC SMPTE ST 12, one per channel  
One mini-XLR per input and one mini-XLR with input and output  
1 kΩ input, 50Ω output impedance

### One VITC reader/writer per video:

Lines 10-21 on 525 configurations, lines 6-23 on 625 configurations  
Ancillary timecode

### Control

#### Interconnects:

Four RS-422 serial ports  
100/1000Base-T Ethernet port

#### Protocols:

BWW (RS-422) (w/o insert edit)  
VDCP (RS-422)  
AMP (RS-422 and Ethernet)  
K2.net native API

#### Media Exchange

MXF OP1a, GXF (SMPTE ST 360), AVI and QuickTime

#### Discrete AES/EBU Audio Tracks (per video channel)

8 input and 8 output tracks (4 AES pairs) audio  
DB25 pin connector (optional) – Yamaha  
AES D-sub pin out (CD8AES & MY8AE)

#### Audio Specifications

Input: 48 kHz, 16- or 24-bit digital audio=PCM  
Sample rate conversion on inputs (32 kHz to 96 kHz) to 48 kHz

Output: 48 kHz clock derived from video reference, 16- or 24-bit

Compliant with SD-SMPTE ST 259, HD-SMPTE ST 292

Compressed audio types: AC-3 and Dolby E pass-through

Audio delay adjustable ±200 ms relative to output video

#### Remote Monitoring

Grass Valley SNMP-based remote facility monitoring software

#### Certifications

UL 60950, FCC Class A, EMC Class A, CE, C-Tick, CSA 60950, IEC 950, EN 60950

#### Included in Package

Power cords (2)  
LTC cables (4)  
Quick Start guide  
USB stick with documentation

## K2 Summit 3G Production Clients with Internal Storage (in hours\*)

Format Data Drives	DVCPRO	DVCPRO 50	DVCPRO HD	IMX 30	XDCAM HD	XDCAM HD
600 GB RAID-1 (6/6)	240	120	60	207	183	132
600 GB RAID-0 (12/0)	480	240	120	414	366	264
900 GB RAID-1 (6/6)	360	180	90	310	275	198
900 GB RAID-0 (12/0)	720	360	180	621	549	396

RAID-1 = 6 data drives and 6 parity drives. RAID-0 = 12 data drives

\* Time for video with four 16-bit audio channels, no ancillary data. Times are estimated and can vary by ±10%.

## K2 Summit 3G Production Client

### ORDERING

**K2-XDP2-02** K2 Summit 3G Production Client – 2 RU platform with 2 bidirectional HD/SD channels. Supports DV, DVCPRO, DVCPRO 50, DVCPRO HD and HD/SD MPEG-2 record and agile playback of DV, DVCPRO, DVCPRO 50, DVCPRO HD and HD/SD MPEG-2 playback. Connects to shared storage via iSCSI over Ethernet or using optional 8 Gb/s Fibre Channel or can be configured with internal SAS storage. Includes dual hot-swappable power supplies, hot-swappable fans, and AppCenter control and configuration application.

**K2-XDP2-04** K2 Summit 3G Production Client – 2 RU platform with 4 bidirectional HD/SD channels. Supports DV, DVCPRO, DVCPRO 50, DVCPRO HD and HD/SD MPEG-2 record and agile playback of DV, DVCPRO, DVCPRO 50, DVCPRO HD, and HD/SD MPEG-2 playback. Connects to shared storage via iSCSI over Ethernet or using optional 8 Gb/s Fibre Channel or can be configured with internal SAS storage. Includes dual hot-swappable power supplies, hot-swappable fans, and K2 AppCenter control and configuration application.

#### Options

##### K2-ISCSI

K2 Summit iSCSI connection to the K2 SAN through Gigabit Ethernet.

##### K2-XDP-FC8GD

K2 Summit client Fibre Channel connection to K2 direct attached storage. Includes dual-port 8 Gb/s Fibre Channel host bus adapter.

##### K2-XDP-FC8GS

K2 Summit single client Fibre Channel connection to K2 SAN storage. Includes dual-port 8 Gb/s Fibre Channel host bus adapter.

##### K2-XDP2-12-600R0

K2 Summit 3G internal media storage, includes 12 x 600 GB SAS media drives and RAID controller. Configured as RAID-0 (12 data/no parity). Select one internal media storage option only.

##### K2-XDP2-12-600R1

K2 Summit 3G internal media storage, includes 12 x 600 GB SAS media drives and RAID controller. Configured as RAID-1 (6 data/6 parity). Select one internal media storage option only.

##### K2-XDP2-12-900R0

K2 Summit 3G internal media storage, includes 12 x 900 GB SAS media drives and RAID controller. Configured as RAID-0 (12 data/no parity). Select one internal media storage option only.

##### K2-XDP2-12-900R1

K2 Summit 3G internal media storage, includes 12 x 900 GB SAS media drives and RAID controller. Configured as RAID-1 (6 data/6 parity). Select one internal media storage option only.

##### K2-XDP2-10-S400R5

K2 Summit 3G internal media storage, includes 10 x 400 GB SSD media drives and RAID controller. Configured as RAID-5 (8 data/2 parity). Select one internal media storage option only

##### K2-XDP2-10-S800R5

K2 Summit 3G internal media storage, includes 10 x 800 GB SSD media drives and RAID controller. Configured as RAID-5 (8 data/2 parity). Select one internal media storage option only

##### K2-XDP2-10-S1600R5

K2 Summit 3G internal media storage, includes 10 x 1.6 TB SSD media drives and RAID controller. Configured as RAID-5 (8 data/2 parity). Select one internal media storage option only

##### K2-XDP2-AVC-2CH

K2 Summit 3G 2-channel AVC-Intra codec and H.264 playback license. Includes AVC-Intra level 50 and 100 and encoding and decoding and H.264 L4.2 AVCHD playback. Two required for 4-channel model (K2-XDP2-04) Factory installed.

##### K2-XDP2-MPG2-MC

K2 Summit 3G MPEG-2 multicam encoding factory option. Adds the ability to record up to 4 video streams per codec module using MPEG-2 compression when used in ChannelFlex mode. Includes hardware and additional MPEG encoding license. Two K2-XDP2-MPG2 options are required for the K2-XDP2-04 and enables up to 8 video streams to be recorded. Also requires factory installed AppCenter Elite license (see K2- APPCTNR-ELTE-FO below).

##### K2-XDP2-DNX-2CH

K2 Summit 3G DNxHD license. Includes DNxHD encoding and decoding. Two required for 4-channel model (K2-XDP2-04). Factory installed.

##### K2-XDP2-10GB

K2 Summit Client dual port RJ-45 copper Ethernet 10 GigE host adapter card. Adds 10 GigE connectivity to K2 Summit Client. Factory install.

##### K2-TIMEDELAY

K2 software application to control one or two record channels and up to three play channels on a K2 Summit Production Client

##### K2-INSYNC-STA

K2 software application synchronizes two K2 standalone file systems.

##### K2-APPCNTR-PRO-FO

K2 AppCenter Pro for the K2 Summit Platform extends the feature set of standard AppCenter and includes such features as audio track tagging, super out and proxy encoding licenses for 4 channels of low-resolution proxy generation. Factory installed.

##### K2-APPCTNR-ELTE-FO

K2 AppCenter Elite for the K2 Summit Platform extends the feature set of standard AppCenter and includes all AppCenter Pro features plus ChannelFlex and proxy encoding licenses for 8 channels of low-resolution proxy generation. ChannelFlex includes 2X and 3X super slo-mo record, key plus fill record and play, and multicam recording. Factory installed.

##### K2-WEBFMF

Flexible Media Framework HTTP Protocol. Adds K2 Central connectivity to K2 Summit Client. Factory install.

#### Spare & Accessories

##### K2-XDP2-PS-SP

K2 Summit 3G client, spare power supply.

##### K2-XDP2-IOM-SP

K2 Summit 3G client, spare codec module.

##### K2-XDP2-CM-SP

K2 Summit 3G client, spare controller module.

##### K2-XDP-AES-CABLES

K2 Summit AES DB25 to XLR break-out cable set, 2 cables per set. Provides 4 each AES XLR connectors for 8 discrete inputs and 4 each XLR AES connectors for 8 discrete outputs.

#### Field Kits

##### K2-APPCNTR-PRO-FK

K2 AppCenter Pro for the K2 Summit Platform extends the feature set of standard AppCenter and includes such features as audio track tagging and proxy encoding licenses for 4 channels of low-resolution proxy generation. Field kit.

##### K2-APPCTNR-ELTE-FK

K2 AppCenter Elite for the K2 Summit Platform extends the feature set of standard AppCenter and includes all AppCenter Pro features plus ChannelFlex and Proxy encoding licenses for 8 channels of low-resolution proxy generation. ChannelFlex includes 2X and 3X super slo-mo record, key plus fill record and play, and multicam recording. Field kit.

##### K2-XDP2-AVC-2CH-FK

K2 Summit 3G 2-channel AVC-Intra codec and H.264 playback license. Includes AVC-Intra level 50 and 100 and encoding and decoding and H.264 L4.2 playback. Two required for 4-channel model (K2-XDP2-04). Field kit.

##### K2-XDP2-MPG2-MC-FK

K2 Summit 3G MPEG-2 multicam encoding field kit. Adds the ability to record up to 4 video streams per codec module using MPEG-2 compression when used in ChannelFlex mode. Includes hardware and additional MPEG encoding license. Two K2-XDP2-MPG2-FK kits are required for the K2-XDP2-04 and enables up to 8 video streams to be recorded. Also requires AppCenter Elite license (see K2-APPCTNR-ELTE-FK above).

##### K2-XDP2-DNX-2CH-FK

K2 Summit 3G DNxHD license. Includes DNxHD encoding and decoding. Two required for 4-channel model (K2-XDP2-04). Field kit.

##### K2-XDP2-10GB-FK

K2 Summit Client dual port RJ-45 copper Ethernet 10 GigE host adapter card. Adds 10 GigE connectivity to K2 Summit Client. Field kit.

# K2 Summit IP

IP-enabled Client for 3G Workflows

Available as a standalone media server or a field upgrade to K2 Summit 3G media servers.



The K2 Summit IP is a new member of the K2 Summit family enabling SMPTE ST 2022-6 IP connectivity for audio and video in production applications. K2 Summit IP is the ideal server solution for any K2 media server with an existing requirement for IP connectivity, or a desire to migrate to IP in the future.

K2 Summit IP provides up to four SFP connections for IP inputs and outputs that integrate seamlessly with other Grass Valley IP-enabled

products including the LDX IP-enabled base station, our new K-Frame IP I/O board and the NVISION 8500 hybrid router, as well as other SMPTE ST 2022-6 compatible products.

IP video playout is via SFP modules with two ports per codec board. K2 Summit IP provides up to four bidirectional channels of video I/O.

The K2 Summit IP media server offers up to four 1080p inputs or outputs per codec board. The I/O cards also supply simultaneous I/O via SDI

using mini-DIN connectors, allowing the server to be used in hybrid IP/SDI environments which demand both IP and SDI connectivity.

The new K2 Summit IP module is also available as an F-kit for upgrading existing K2 Summit 3G units in the field.

## KEY FEATURES

- K2 Summit IP with SMPTE ST 2022-6 I/O will also continue to support baseband video
- Available as standalone server with internal storage or as a client with external storage
- Field upgradeable
- Excellent interoperability with SMPTE ST 2022-6 enabled cameras, production switchers and signal management systems
- Can be “mixed & matched” to combine SMPTE ST 2022-6 IP and SDI codecs to suit the requirements of individual broadcasters
- Seamless integration with K2 Dyno and LDX IP-enabled camera base stations
- TICO compression (scheduled for summer 2016)

## TICO Lossless Compression: 4K over 1-Wire Signal Transport

TICO is a lossless transport compression scheme that allows 12G 4K (UHD-1/3840x2160p50/59.94) over SDI and IP-based infrastructures with minimal processing and 4:1 compression. This allows a single 3G-SDI cable to carry a 4K signal, as opposed to four 3G cables where the signal will have to be split into four components and then re-assembled.

Low latency of a few lines of pixels for encoding and decoding are a significant benefit of TICO’s unique line-based wavelet transforms and light entropy coding for live and other real-time signal transport needs. This makes TICO ideal for live productions, especially compared with the latency and complexity of other compression schemes, such as JPEG 2000, H.264 and H.265. Plus, TICO implementation protects current investments in infrastructure.

For those considering video over IP, consider this: TICO works equally well with both SMPTE ST 2022-6 (Transport of High Bit Rate Media Signals over IP Networks) as well as with the recently published VSF Technical Recommendation TR-03 (Transport of Uncompressed Elementary Stream Media over IP).

## SPECIFICATIONS

As per K2 Summit 3G, but with the following additions:

- 4 SD/HD channels
- All channels are bidirectional
- IP Interface: 2x SFP modules per codec board

## ORDERING

- **K2-XDP2-02-IP** K2 Summit IP Server (2-channel), comprising K2 Summit server I/O client and one 2-channel codec module
- **K2-XDP2-04-IP** K2 Summit IP Server (4-channel), comprising K2 Summit server I/O client and two 2-channel codec modules

### Upgrade Kits

- **K2-XDP2-IP-2CH** K2 Summit Client IP Codec Module — add SMPTE ST 2022-6 connectivity to K2 Summit Client (Factory Install)
- **K2-XDP2-IP-2CH-FK** K2 Summit Client IP Codec Module — add SMPTE ST 2022-6 connectivity to K2 Summit Client (Field Kit)



# K2 Solo 3G

**K2 Solo** is a broadcast-capable, 2-channel, portable, cost-effective, standalone server with up to 32 hours of HD storage. It's optimized for both production and broadcast workflows.

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The 2-channel K2 Solo 3G packaged in a compact ½ rack width, 2 RU package. It is software-compatible with K2 Summit applications including support for the K2 Dyno Replay System.

## Applications

K2 Solo 3G is ideal for:

- Broadcasters
- Live mobile production
- Stadiums – big screen support
- Sports/news centers – feed records
- Universities – sports programs

K2 Solo 3G is optimized for production and live event workflows. Teamed with the K2 Dyno Replay Controller and the Grass Valley STRATUS Video Production and Content Management Toolset, it offers an ideal solution for live events such as sports and concerts, studio production, news and any application that requires quick access to recorded media.

## There are two models:

- Record/playback DVCPRO 25/50, DVCPRO HD, MPEG-2 including IMX and XDCAM HD. Includes AppCenter Pro, carrying handle and feet for portable use
- Record/playback DVCPRO 25/50, DVCPRO HD, MPEG-2 including IMX and XDCAM HD, and AVC-Intra 50/100\*. Includes AppCenter Elite with ChannelFlex, carrying handle and feet for portable use

\* AVC-Intra support can be added with an additional software license.

For fast boot times and high reliability, K2 Solo 3G features CompactFlash running an embedded operating system. This also protects it from virus attacks as a simple reboot will clear any problems.

K2 Solo 3G is capable of simultaneously encoding low-resolution proxy files along with the high-resolution recording to extend workflows to the user's desktop.

## ChannelFlex-Compatible

With AppCenter Elite, K2 Solo 3G's two channels can double in capability. For example, with ChannelFlex some of the new configurations are:

- 2 camera inputs and 1 play channel
- 1 Super SloMo camera input and 1 play channel
- 4 camera inputs
- 1 3D camera feed and 1 play channel
- Video+key record or playout on each channel

## Production Features

K2 Solo 3G's portability and ruggedness make it ideal for live events. It can be used with K2 Dyno for powerful playback capability including instant replay.

Specific production features include:

- Instant replay within ½ second
- Built-in multiviewer mode
- Built-in mix effects on each channel
- Support for DV, MPEG-2 and AVC-Intra\* acquisition formats and playback

K2 Solo 3G uses a QuickTime-compatible file system which lets NLEs such as EDIUS and Final Cut Pro 7 directly edit content while it is still being recorded.

## Broadcast Features

Broadcast support includes up/down/cross conversion with full AFD support for aspect ratio conversion and up to 16 audio channels per video for support of multiple languages with PCM or compressed audio. Tight integration with the Grass Valley Kayenne switcher provides a powerful video ClipStore capability.

Two-channel codec module: With ChannelFlex, each channel can record 2 camera feeds or 1 super slo-mo camera. Two SDI output BNCs provide an on-air output and a configurable monitor output or support for 2 streams from a 3D or video+key file. 8 AES audio channels on DB25 connector, LTC I/O and RS-422 (RJ-45) for control.

Control module with VGA multiviewer output, GPIs, Ethernet connections, USB and IEEE 1394 connectors, and reference.



## K2 Solo 3G

### KEY FEATURES

- Small form factor: ½ rack width, 2 RU high
- Two bidirectional channels with DV and MPEG-2 support
- AVC-Intra 50/100 support is available
- Internal Storage of 2x400 GB SSD for enhanced storage reliability
- Up to 55 hours of SD DV25 storage and 32 hours of HD storage (XDCAM HD 50) on SSD
- Simultaneous high-resolution and low-resolution proxy encoding  
Instant replay — record-to-play in less than ½ second
- AppCenter Pro comes standard
- ChannelFlex-compatible with AppCenter Elite:
  - Multicam mode
  - Super SloMo mode:
    - 3D
    - Video + key
- HD/SD-SDI monitor output with timecode burn-in and custom text overlays
- Multiviewer monitor mode with custom text overlays
- Built-in mix effects within a single play channel
- Fast boot times with embedded operating system on CompactFlash media
- QuickTime-compatible file system for edit-in-place with Final Cut Pro 7, EDIUS and other NLEs control operation with Grass Valley production switchers and vision mixers

### SPECIFICATIONS

#### HD Compression Formats

DVCPRO HD  
MPEG-2@HL 4:2:0, I-Frame & Long GOP, 12-80 Mb/s  
MPEG-2@HL 4:2:2, I-Frame & Long GOP, 20-100 Mb/s  
XDCAM HD (25, 35, 50 Mb/s)  
XDCAM EX  
AVC-Intra 50/100  
H.264 playback

#### SD Compression Formats

DV, DVCPAM, DVCPRO 25/50  
MPEG-2@ML 4:2:0, I-Frame & Long GOP, 2-15 Mb/s  
MPEG-2@ML 4:2:2, I-Frame & Long GOP, 4-50 Mb/s  
D10/IMX 30/40/50

#### Video Channels

2 HD/SD-SDI record/play channels

**SD-SDI:** SMPTE ST 259, ITU-R601, 525/625 line component, 10-bit

**HD-SDI:** SMPTE ST 292, 10-bit

#### Proxy Encoding

2 or 4 streams (licensed through AppCenter Pro or AppCenter Elite)

Each stream includes 1 video and up to 8 audio tracks for recording. Any audio track can be selected when streaming

**Video:** MPEG-4 part 2

**Audio:** AAC

#### Monitor Modes

SDI monitor out with timecode burn-in  
VGA multiviewer  
Definable text overlay includes channel name, clip name, transport status, play speed, audio meters and other status

#### Video Playback Output

All clips play seamlessly back-to-back  
Off-speed play with line interpolation  
Video/audio mix effects  
Dissolves between two video tracks  
Fade up/down to matte color

#### Conversion and Aspect Ratio

525↔1080i/720p, 625↔1080i/720p  
720p↔1080i cross conversion  
4:3-16:9 aspect ratio conversions  
Embedded audio tracks  
16 embedded channels/video

#### Discrete AES/EBU Audio

8 input and 8 output tracks (4 AES pairs) per video channel  
DB25 pin connector per video channel (XLR breakout cable is optional)

#### Audio Specifications

**PCM:** 48 kHz, 16- or 24-bit  
Sample rate conversion to 48 kHz  
AC-3 and Dolby E pass-through

#### Audio Special Features

Scrub audio support (±2X)  
Audio click elimination  
Audio tagging and audio mapping

#### Solid State Drive Storage (±10%)

(Assumes 4-tracks of 16-bit audio)  
DV25/DV50/100 = 50/27/14 hours  
MPEG-2@: 12/25/50/100 Mb/s = 112/60/32/16 hours

#### Power Requirements

100-240V, 50/60 Hz  
**Typical power:** 180 watts

#### Physical Characteristics

**Dimensions (HxWxD):** 89 x 210 x 446 mm (3.5 x 8.25 x 17.7 in.)  
**Weight:** 7.5 kg (16.5 lbs.)

#### Environmental Characteristics

**Operating temperature:** 10° to +40°C (50° to 104°F)  
**Non-operating temperature:** -40° to +60°C (-40° to 140°F)  
**Operating relative humidity:** 20% to 80% from -5° to +45°C (23° to 113°F)  
**Non-operating relative humidity:** 10% to 80% from -30° to +60°C (-22° to 140°F)

#### GPI

12 in, 12 out – DB25 pin connector

#### Reference Genlock

NTSC/PAL black composite analog  
Two BNC, 75Ω passive loop through  
**Burst frequency lock:** PAL +10 Hz at subcarrier; NTSC +20 Hz at subcarrier  
Tri-Level sync conforms to SMPTE ST 296 for 1280x720p and SMPTE ST 274 for 1920x1080

#### Timecode (per video channel)

LTC SMPTE ST 12 on mini XLR  
One VITC reader/writer  
Ancillary timecode

#### Protocols

BWV (RS-422) (w/o insert edit)  
Odetics/VDCP (RS-422)  
AMP (RS-422 and Ethernet)  
K2.net native API

#### Ports

Four 100/1000Base-T Ethernet ports  
1 Express Card, 34 mm (front)  
4 USB 2.0 front, two USB 2.0 rear  
FireWire (IEEE 1394)  
One RJ-45 serial port per channel  
15-pin SVGA  
USB keyboard, mouse

#### Remote Monitoring

Grass Valley SNMP-based remote facility monitoring software

#### Certifications

UL 60950, FCC Class A, EMC Class A, CE, C-Tick, CSA 60950, IEC 950, EN 60950

#### Included in Package

Power cord  
LTC cables (2)  
USB mini keyboard & mouse  
Documentation CD  
Quick Start guide  
USB stick with recovery image

### ORDERING

**K2-SOLO3G-SSD** K2 Solo 3G SD/HD Media Server. Two bidirectional channels, ½ rack package, 10-hour storage capacity @ 100 Mb/s, support for recording and playing back DVCPRO 25/50, DVCPRO HD, MPEG-2 including IMX and XDCAM HD. Also includes AppCenter Pro, carrying handle and feet for portable use

#### K2-XDP-AES-CABLES

AES DB25 to XLR break-out cables (2). Each cable provides 8 input and 8 output AES XLR connectors for one K2 Solo video channel

#### K2-XDP2-AVC-2CH

2-channel AVC-Intra codec and H.264 playback license

**K2-SOLO3G-ELITE-SSD** K2 Solo 3G Elite SD/HD Media Server. Two bidirectional channels, ½ rack package, 10-hour storage capacity @ 100 Mb/s, support for recording and playing back DVCPRO 25/50, DVCPRO HD, MPEG-2 including IMX and XDCAM HD and AVC-Intra 50/100. Also includes AppCenter Elite with ChannelFlex, carrying handle and feet for portable use

#### K2-SOLO-RACK

Dual rack adapter for side-by-side mounting in standard equipment rack

#### K2-SOLO-HANDIPAK

Handle and feet/corners protector kit

# K2 Summit 3G Transmission

K2 Summit 3G Transmission clients are optimized for the demands of play-to-air, providing high-capacity storage for standalone, shared storage and distributed workflows.



The Grass Valley K2 Summit 3G is a high-performance, multiformat platform that can be configured to address a wide variety of markets and applications. The flexibility of the platform enables special purpose configurations to be offered with specific capabilities at a cost-effective price.

The K2 Summit 3G Transmission client is designed to work in different storage configurations. It can function as a distributed standalone device with internal drives, or it can be a component of a K2 SAN using shared storage.

K2 Summit 3G Transmission clients and servers support MPEG-2 and DV playout bit rates up to 100 Mb/s, which satisfies the majority of the world's need for high-quality SD or HD playout.

Models can support SD or HD/SD with up to four channels, implemented as two bidirectional and two playout channels only, providing a variety of configuration options including two record and two playout channels as well as four playout channels only.

## K2 Summit 3G Platform Overview

The K2 platform is comprised of one or more K2 clients connected to one or more K2 media servers and K2 RAID-protected storage. The K2 client performs all video and audio I/O using built-in encoders and decoders. More than 100 client channels can be attached to K2 media servers and RAID system. For its part, the K2 media server manages the file system and controls file transfer protocol (FTP) operations. The K2 SAN offers for RAID-5 or RAID-6 protected storage that can scale to more than 50 terabytes.

The K2 Summit 3G is a 2 RU platform with redundant hot-swappable power supplies and redundant Ethernet ports. It includes an embedded OS that runs off of a CompactFlash system drive providing fast and reliable operation. Added to this architecture is Grass Valley's Emmy Award-winning core video technology. Each channel is built around a high-performance RISC processor, an embedded real-time operating system, and perform video/audio processing in the robust and secure manner needed for a 24/7, frame-accurate environment. With built-in up/down/cross-conversion capability, it provides an effective solution for those migrating from SD to HD.

## K2 Summit 3G Transmission Client

Transmission applications generally run at the most efficient bit rates possible to keep storage and transmission costs low and I/O configurations that are oriented towards playout channels.

The K2 Summit 3G Transmission client is optimized around these requirements while maintaining the high level of ruggedness and reliability established in the K2 Summit 3G Production client.

When used in a K2 SAN shared storage implementation, the K2 Summit 3G Transmission client offers two iSCSI or Fibre Channel ports to provide a backup data path in case of a failure for a cost-effective approach to no single point of return redundancy.

Transmission applications generally run at the most efficient bit rates possible to keep storage and transmission costs as low as possible. The common rate for SD MPEG is 10-15 Mb/s and HD is 25-100 Mb/s. K2 Summit 3G Transmission clients can be configured with the latest 2 TB 7.2K RPM SAS drives to cost-effectively provide the highest storage capacity in the minimum space. This offers mirrored storage of up to 1,100 hours at 12 Mb/s, 312 hours at 50 Mb/s or 156 hours at 100 Mb/s. With a wide variety of support from the world's automation and media asset management suppliers, and the flexibility to import a variety of file formats, the K2 Summit 3G Transmission client provides a quick, easy and cost-effective solution to a diverse range of playout needs.

# K2 Summit 3G Transmission

## KEY FEATURES

- Affordable SD/HD playout system for broadcasters
- Compact 2 RU chassis with redundant power supplies
- Up to 4 configurable channels, with two playout channels and two bidirectional channels (record or playout)
- Play DV, MPEG formats back-to-back
- Clients with direct external storage connection or shared storage connection to K2 SAN
- Servers with eight 2 TB 7.2K SAS drives configured as RAID-10:
  - 1,100 hours at 12 Mb/s
  - 312 hours at 50 Mb/s
  - 156 hours at 100 Mb/s
- Multiple SDI outputs per channel:
  - SDI on-air output
  - SDI monitor output with timecode burn-in
- Quad split multiviewer with audio level meters, clip name, timecode burn-in, countdown and transport controls (part of K2 AppCenter Pro)
- Built-in automatic up/down/crossconversion with aspect ratio conversion and full AFD support
- Easy to service chassis from within the rack
- Embedded OS on CompactFlash
- Import/export supported formats as MXF OP1a, SMPTE ST 360 (GXF) or QuickTime
- Comprehensive protocol support for control by wide range of automation and other applications
- Channel control over RS-422 or Ethernet (with selected applications)
- AppCenter-based Playlist Manager for simple playback options
- QuickTime-compatible file system provides easy interfaces to NLE systems
- Wide support from automation and media asset management suppliers

## SPECIFICATIONS

### Video Channels

BNC, 75 $\Omega$

**SD SDI:** SMPTE ST 259, ITU-R601, 525/625 line component, 10-bit

**HD-SDI:** SMPTE ST 292, 10-bit

### Configurations – Client

4 playout channels

3 playout channels and 1 record channel

2 playout channels and 2 record channels

Additional configurations available with the K2-XDT1-BCH option

### Configurations – Server

#### 4-Channel Models:

4 playout channels

3 playout channels and 1 record channel

2 playout channels and 2 record channels

Additional configurations available with the K2-XDT1-BCH option

#### 2-Channel Model:

2 playout channels

1 playout channel and 1 record channel

Additional configurations available with the K2-XDT1-BCH option

### Formats

#### SD:

DV, DVCAM, DV25, DV50

MPEG-2@ML 4:2:0, I-Frame & Long GOP  
2-15 Mb/s

MPEG-2 @ML 4:2:2, I-Frame & Long GOP  
4-50 Mb/s

#### HD:

DVCPRO HD (requires K2-XDT1-DVHD-2CH option)

AVC-Intra Class 50 and Class 100 (requires K2-XDT1-AVC-2CH option)

H.264 (playout only, included with K2-XDT1-AVC-2CH option)

MPEG-2@HL 4:2:0, I-Frame & Long GOP 12-100 Mb/s

MPEG-2@HL 4:2:2, I-Frame & Long GOP 20-100 Mb/s

XDCAM HD (18, 25, 35 Mb/s)

XDCAM HD 4:2:2 (50 Mb/s)

XDCAM EX

### Monitor Output

Each channel has a secondary SDI monitoring output with optional timecode burn-in (with AppCenter Pro option)

### Multiviewer Output

Built-in multiviewer displays all four channels on one VGA monitor (with K2 AppCenter Pro option)

### Up/Down/Crossconversion and Aspect Ratio

525i→1080i, 525i→720p, 625i→1080i, 625i→720p

720p→1080i crossconversion

AFD support for 4:3→16:9 aspect ratio conversion with format specified basis with clip by clip override capability

Bar, half-bar, crop and stretch options configurable via UI, AMP protocol or K2.net (native protocol)

### Storage Connections – Client

**Direct Connect:** 8 Gb/s Fibre Channel

**K2 SAN Connect:** 8 Gb/s Fibre Channel single or dual redundant connections

iSCSI over Ethernet single or dual redundant connections

### Storage Capacities – Server

#### 8 2 TB 7.2K SAS drives

#### RAID-10 configurations:

8 Mb/s = 1,500 hours

12 Mb/s = 1,100 hours

15 Mb/s = 920 hours

25 Mb/s = 592 hours

50 Mb/s = 312 hours

100 Mb/s = 156 hours

### Audio Specifications

**Input:** 48 kHz, 16- or 24-bit digital

Audio PCM

Sample rate conversion on inputs (32 kHz to 96 kHz) to 48 kHz

**Output:** 48 kHz clock derived from video reference, 16- or 24-bit

Compliant with SD-SMPTE ST 259, HD-SMPTE ST 292

Audio delay adjustable  $\pm$ 200 ms relative to output video

Pass-through of Dolby D and E

### E-to-E Mode

Less than one frame delay

No re-timing applied

### Audio Special Features

Scrub audio support ( $\pm$ 2X)

Audio click elimination

Agile playback of clips with different supported audio formats

Audio tagging and audio mapping (with K2 AppCenter Pro)

### GPI

12 in, 12 out – 25-pin D connector (DB25)

### Reference Genlock

NTSC/PAL black composite analog

Two BNC, 75 $\Omega$  passive loop-through

**Burst frequency lock:** PAL, +10 Hz at subcarrier  
NTSC, +20 Hz at subcarrier

### Timecode

LTC SMPTE ST 12 one per channel

One mini-XLR per input and output

One VITC reader/writer per video

### Control

#### Interconnects:

Two or four RS-422 serial ports

100/1000Base-T Ethernet port

#### Protocols:

BWW (RS-422) (w/o insert edit)

VDCP & Odetics (RS-422)

AMP (RS-422 and Ethernet)

K2.net native API

### Media Exchange

MXF OP1a, GXF (SMPTE ST 360), AVI and

QuickTime

### Ports

Four 100/1000Base-T Ethernet ports

One USB 2.0 front, two USB 2.0 rear

One RS-422 serial port per channel

15-pin SVGA

### Remote Monitoring

Grass Valley SNMP-based remote facility-monitoring software

### Certifications

UL 60950, FCC Class A, EMC Class A, CE, C-Tick, CSA 60950, IEC 950, EN 60950

### Power Requirements

Dual redundant 500W maximum, 300W typical

Auto-sensing, hot-swappable

100-240 VAC, 50-60 Hz

### Dimensions

**Height:** 2 RU (9 cm (3.5 in.))

**Width:** 44.5 cm (17.5 in.)

**Depth:** 61.6 cm (24.3 in.)

**Weight:** 24 kg (52.9 lbs.) maximum

### Environmental Characteristics

**Operating temperature:** 10° to +40°C (50° to 104°F)

**Non-operating temperature:** -40° to +60°C (-40° to 140°F)

**Operating relative humidity:** 20% to 80% from -5° to +45°C (23° to 113°F)

**Non-operating relative humidity:** 10% to 80% from -30° to +60°C (-22° to 140°F)

### Included in Package

Power cords (2)

LTC cables (4)

Documentation CD

QuickStart guide

USB stick with recover image

## K2 Summit 3G Transmission

### ORDERING

#### K2-XDT1-02

##### K2 Summit 3G Transmission 2-Channel Client

- 2 RU platform with 1 bidirectional and 1 playout HD/SD channel
- I/O configurable as 1 x 1 or 0 x 2
- Supports one MPEG-2 HD/SD record at up to 100 Mb/s
- All outputs support agile playback of DV/DVCPRO, MPEG-2, SD and HD at bit rates up to 100 Mb/s
- Can connect to shared storage via iSCSI over Ethernet
- Dual hot-swappable power supplies and hot swappable fans
- K2 AppCenter control and configuration application

#### K2-XDT1-04

##### K2 Summit 3G Transmission 4-Channel Client

- 2 RU platform with 2 bidirectional and 2 playout HD/SD channels
- I/O configurable as 1 x 3, 2 x 2 or 0 x 4
- Supports up to 2 MPEG-2 HD/SD records at up to 100 Mb/s
- All outputs support agile playback of DV/DVCPRO, MPEG-2, SD and HD at bit rates up to 100 Mb/s
- Can connect to shared storage via iSCSI over Ethernet
- Dual hot-swappable power supplies and hot swappable fans
- K2 AppCenter control and configuration application

#### K2-XDT1-08-2TR1

##### K2 Summit 3G Transmission Internal Media Storage

- Add to transmission clients for standalone configurations
- Includes eight 2 TB SAS media drives and RAID controller
- Configured as RAID 1-0 (4 data/4 parity)
- Limited to one internal media storage option per client

#### K2-XDT1-02-SD

##### K2 Summit 3G Transmission 2-Channel SD Client

- 2 RU platform with 1 bidirectional and 1 playout SD channel
- I/O configurable as 1 x 1 or 0 x 2
- Supports one MPEG-2 SD record at up to 50 Mb/s
- All outputs support agile playback of DV/DVCPRO, MPEG-2 and SD at bit rates up to 50 Mb/s
- Can connect to shared storage via iSCSI over Ethernet, or can be configured with internal storage
- Dual hot-swappable power supplies and hot swappable fans
- K2 AppCenter control and configuration application

#### K2-XDT1-04-SD

##### K2 Summit 3G Transmission 4-Channel SD Client

- 2 RU platform with 2 bidirectional and 2 playout SD channels
- I/O configurable as 1 x 3, 2 x 2 or 0 x 4
- Supports two MPEG-2 SD records at up to 50 Mb/s
- All outputs support agile playback of DV/DVCPRO, MPEG-2 and SD at bit rates up to 50 Mb/s
- Can connect to shared storage via iSCSI over Ethernet, or can be configured with internal storage
- Dual hot-swappable power supplies and hot swappable fans
- K2 AppCenter control and configuration application

#### Options

##### K2-XDT1-AVC-2CH

K2 Summit 3G Transmission 2-channel AVC codec option. Adds AVC-I recording/playout and H.264 playout. Includes licenses for 2-channel operation; two required for 4-channel models (K2-XDT1-04). Factory installed.

##### K2-XDT1-DVHD-2CH

K2 Summit 3G Transmission 2-channel DVCPRO HD codec option. Adds DVCPRO HD recording/playout. Includes licenses for 2-channel operation; two required for 4-channel models (K2-XDT1-04). Factory installed.

##### K2-XDT1-BCH

K2 Summit 3G Transmission bidirectional channel option. Adds an additional bidirectional channel. Includes licenses for 2-channel operation; two required for 4-channel models (K2-XDT1-04). Factory installed.

##### K2-XDT1-ME-2CH

K2 Summit 3G Transmission mix effects channel option. Adds mix effects playout to SD/HD server (50 Mb/s only). Includes licenses for 2-channel operation; two required for 4-channel models (K2-XDT1-04). Factory installed.

##### K2-XDT1-2HDL

K2 Summit 3G Transmission 2-channel HD I/O option. Adds HD recording/playout to SD-only server. Includes licenses for 2-channel operation; two required for 4-channel models (K2-XDT1-04). Factory installed.

#### Field Kits

##### K2-XDT1-AVC-2CH-FK

K2 Summit 3G Transmission 2-channel AVC codec option. Adds AVC-I recording/playout and H.264 playout. Includes licenses for 2-channel operation; two required for 4-channel models (K2-XDT1-04). Field kit.

##### K2-XDT1-DVHD-2CH-FK

K2 Summit 3G Transmission 2-channel DVCPRO HD codec option. Adds DVCPRO HD recording/playout. Includes licenses for 2-channel operation; two required for 4-channel models (K2-XDT1-04). Field kit.

##### K2-XDT1-BCH-FK

K2 Summit 3G Transmission bidirectional channel option. Adds an additional bidirectional channel. Includes licenses for 2-channel operation; two required for 4-channel models (K2-XDT1-04). Field kit.

##### K2-XDT1-ME-2CH-FK

K2 Summit 3G Transmission mix effects channel option. Adds mix effects playout to SD/HD server (50 Mb/s only). Includes licenses for 2-channel operation; two required for 4-channel models (K2-XDT1-04). Field kit.

##### K2-XDT1-2HDL-FK

K2 Summit 3G Transmission 2-channel HD I/O option. Adds HD recording/playout to SD-only server. Includes licenses for 2-channel operation; two required for 4-channel models (K2-XDT1-04). Field kit.

# K2 Central TX

## Shared Storage Solution



**K**2 Central TX is an extension of the K2 storage line that provides a cost-effective, easy to integrate shared storage solution designed for transmission applications. K2 Central TX supports up to five 4-channel K2 Summit 3G Transmission Clients, delivering your choice of up to 16 simultaneous 100 Mb/s HD video channels or up to 20 simultaneous 50 Mb/s video channels, both with 2 Gb/s of real-time video bandwidth. The integrated approach to shared storage includes the server, storage and network connectivity in one chassis, providing for quick installation and simple configuration on-site. The benefits to the user include reduced cost of implementation and simplification of operation without compromising on performance.

Grass Valley's new shared storage solution leverages the Flexible Media framework technology in the K2 Summit into an optimized shared storage product. Key attributes include the direct connection of five K2 Summit clients without any heavy networking infrastructure.

K2 Central TX utilizes 3.5-inch 7.2K RPM drives for a cost-effective storage system providing the capacity and bandwidth required for many playout applications.

### KEY FEATURES

- Direct Connect via GigE with up to five K2 Summit clients
- Support for up to 16 channels at 100 Mb/s video data rate
- Support for up to 20 channels at 50 Mb/s video data rate
- Dense 4 RU package with 24 x 2 TB, 4 TB or 6 TB HDDs
- 10 GigE connectivity to third-party devices
- RAID-1, 2 SSD drives (operating system)
- RAID-10, 2 x 12-drive stripe groups (media)
- Up to 60 TB of usable storage for more than 800 hours at 100 Mb/s
- Dual power supplies and system drives for reliability

### SPECIFICATIONS

#### Description

4 RU shared storage solution for transmission

#### GigE Interface

RJ45 copper

### ORDERING

#### K2-CENTRAL-TX

K2-CENTRAL-TX-2TB  
K2-CENTRAL-TX-4TB  
K2-CENTRAL-TX-6TB

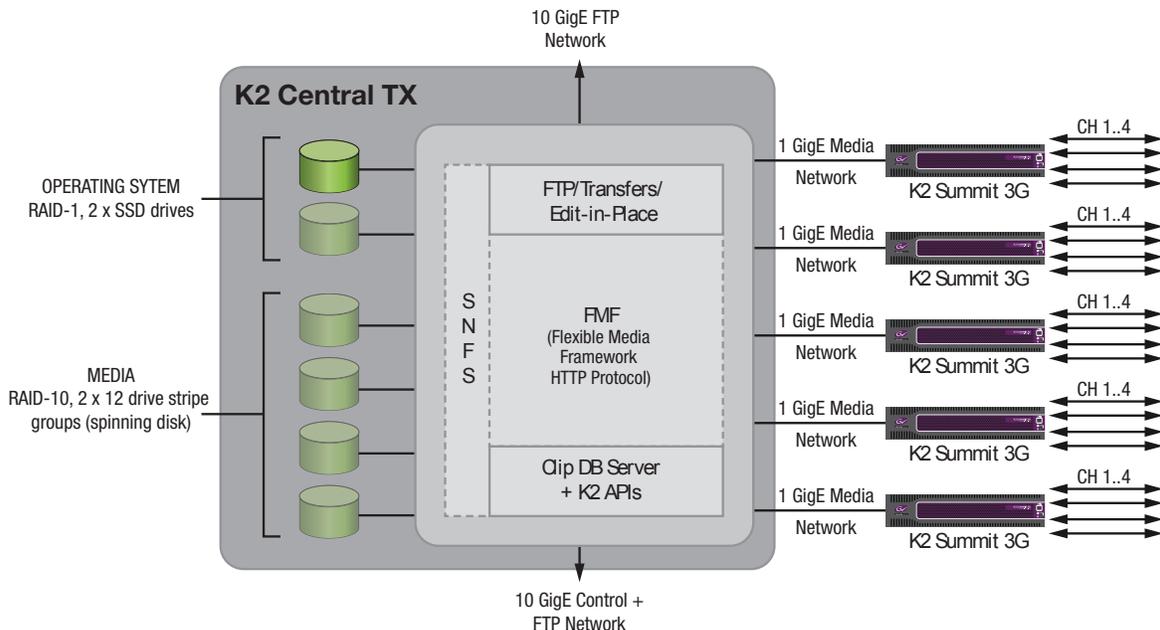
#### Storage server for up to 24 HDDs

4 RU Storage Option, 24 x 3.5" 2 TB HDDs  
4 RU Storage Option, 24 x 3.5" 4 TB HDDs  
4 RU Storage Option, 24 x 3.5" 6 TB HDDs

#### Optional Accessories:

#### K2-CENTRAL-RACK

Optional rack adapter for mounting in standard 19-inch equipment rack



# K2 10G Shared Storage

For maximum flexibility, **K2 10G systems** support online, production, nearline and direct attached storage configurations. Both standard and redundant configurations are available.



**G**rass Valley K2 media server systems are ideal for transmission and production environments, offering support for a wide range of applications to address specific workflow needs in the most cost-effective ways possible.

## K2 Platform – Overview

A K2 SAN is comprised of one or more K2 media clients connected to one or more K2 media servers and K2 RAID-protected storage. The K2 media client performs all video and audio I/O using integrated encoders and decoders. More than 100 media client channels can be attached to the K2 media server and RAID systems in a SAN configuration. K2 direct attached systems offer options for internal drives or external RAID systems. K2 SAN systems can easily scale to provide more storage and/or bandwidth non-destructively.

A K2 media server manages the file system, database, quality-of-service (QOS) for bandwidth control, data bridging and file transfer protocol (FTP) operations.

For storage, the K2 system supports online configurations for direct play-to-air applications, production configurations for ingest and editing, and low-cost, nearline options for media stored in MXF OP1a, GXF (SMPTE ST 360) or QuickTime wrappers.

## K2 Storage Systems – Online, Production, Nearline, Direct Attached

For maximum flexibility, K2 10G systems support multiple online, production, nearline and direct attached storage configurations. These systems are available in both standard and redundant configurations.

## K2 10G Shared Storage Systems

K2 10G shared storage systems use the latest technologies on the market, including dual ported, 8 Gb/s Fibre Channel RAID controllers, high-performance SAS drives, RAID-5 (in some configurations) or RAID-6 protection, dual power supplies and hot-swappable components — all wrapped into a 2 RU package. Any of these enterprise-class configurations can be expanded, without losing a byte of data, for more storage and/or more bandwidth.

The RAID-6 protection of the K2 10G shared storage systems provides a particularly higher level of redundancy than conventional systems by protecting against a two-drive failure in a group of 6 or 12 drives. This ability offers nearly the same level of protection as a fully mirrored system — but at a fraction of the cost.

When replacing any failed drive, a rebuild process will immediately start in the background without loss of system performance.

## Production SAN Storage

Online storage for play-to-air systems requires very high-performance, low-latency storage systems in order to play to air without missing a frame of data. Recording video and editing applications require high performance, but internal buffering while recording puts less stress on the storage system. As such, a Production version of the K2 10G SAN with high-capacity 7.2k RPM SAS drives is also offered. This provides a very cost-effective, high-capacity ingest and editing SAN system.

## Nearline Storage

A K2 nearline system can be an ideal, cost-effective central storage buffer for a media facility. It can be deployed as an archive system, as temporary storage, as post-production storage or other applications.

K2 nearline systems scale from 48 to 864 TB. Larger custom systems can be built as required. The system supports simple FTP connections as well as CIFS connections for NLEs. The systems store data in industry-standard wrappers: MXF OP1a, GXF (SMPTE ST 360) or QuickTime.

## Direct Attached Storage

K2 direct attached clients can support internal drives for a compact package. If more capacity is needed, an external 8 Gb Fibre Channel RAID system can be substituted for internal drives; this system supports up to 48 1.8 TB drives with RAID-5 or RAID-6 protection with a redundant RAID controller for added protection.

## K2 Media Server

The K2 media server is the engine of the system. It manages the file system, database, FTP transfers, bandwidth, and connects K2 clients to a storage system. Its built-in QOS guarantees that enough bandwidth is always available to your video channels, regardless of other demands on the system. The server can also dynamically allocate unused bandwidth where needed, such as for non-real-time functions, such as file transfers.

The server uses iSCSI technology over Gigabit Ethernet or Fibre Channel connectivity for a highly reliable connection between its client and storage. For reliable performance, it uses TCP/IP offload engines (TOE cards) to minimize the CPU load. Additional K2 media servers can be added to a system for more video/audio bandwidth or to function as a dedicated FTP server (see Figure 1) with 10 Gb/s connections to support devices such as high-speed tape archive systems.

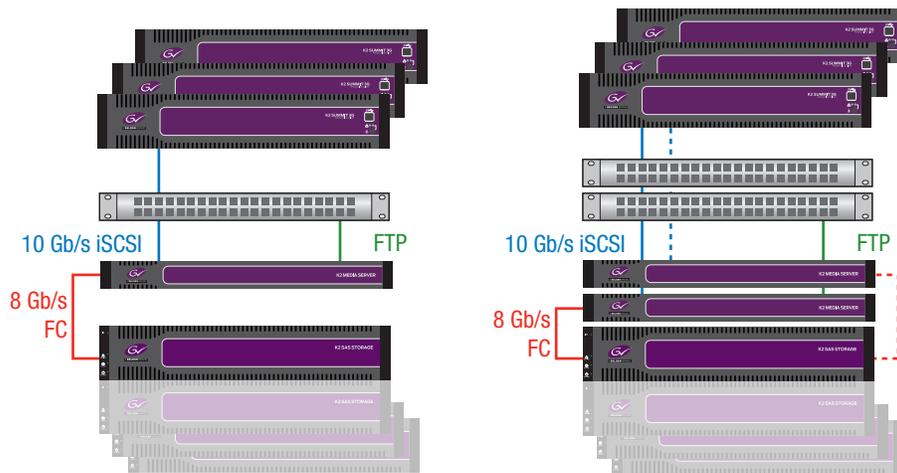
# K2 10G Shared Storage

## KEY FEATURES

- Multiple options to meet the exacting requirements for online, production and nearline storage
- Storage architecture supports 10k RPM SAS drives for highest-performance online storage or 7.2k SAS drives for lowest cost/GB of storage
- Uses the latest IT technologies for best price/performance:
  - 7.2k or 10k RPM SAS drives
  - 10 Gb/s Ethernet connectivity
  - 8 Gb/s Fibre Channel connectivity
- Highest bandwidth in the industry
- Scalable bandwidth – easily add to existing systems
- Scalable storage – easily add non-destructively to existing systems
- High availability – redundant components include hot-swappable power supplies, fans, disk drives, RAID controllers, mirrored system drives
- Systems can be built simply with fewer components, in less rack space, for higher reliability
- Open-storage technology supports industry standards:
  - CIFS for broad access to video/audio files
  - MXF/GXF/QuickTime wrappers
  - FTP for standard file transfer operability
  - Built-in QOS with dynamic-bandwidth allocation guarantees available video/audio bandwidth while sharing the rest for edit clients and file transfers
- 8 Gb/s Fibre Channel RAID controllers offer highest performance available
- Advanced eco-friendly energy saving technology:
  - Low-power CPU
  - Autonomous control
  - 80PLUS GOLD certified high-efficiency power supply
  - Incorporates as many power saving components as possible
  - A significant reduction in the total number of components
  - Can be used in 40°C (104°F) environments, reducing cooling costs

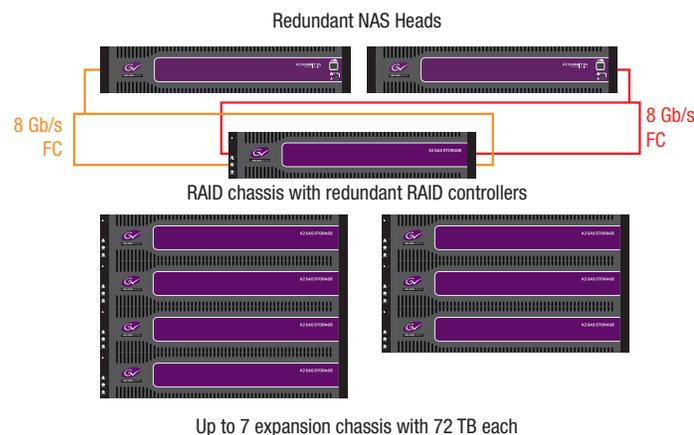
## Standard and Redundant Configurations

Figure 1 – K2 10G systems support standard and redundant storage configurations. Total bandwidth and storage is scalable to fit any application precisely. K2 10G scales from lower-priced systems that support from 4 to approximately 20 channels, to mid-range systems that go up to approximately 50 channels. Even larger configurations can support hundreds of HD channels, several thousand MB/s of bandwidth and hundreds of TBs of capacity for creating the very largest video server systems. Any basic K2 online storage system can be made more redundant by adding a backup server, switch and RAID controller. Shown here is a simple redundant system which can also gain more FTP bandwidth through the addition of dedicated FTP servers.



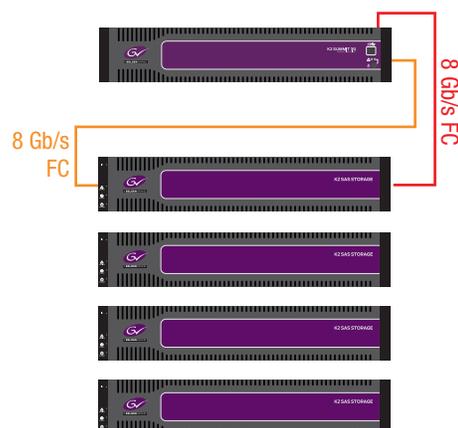
## Cost-Effective Nearline Storage

Figure 2 – K2 nearline systems offer cost-effective storage without sacrificing support for high-bandwidth file transfers. Featuring RAID-6 protection with up to 400 MB/s of bandwidth, it can scale up to 864 TB of raw storage.



## Direct Attached External Storage

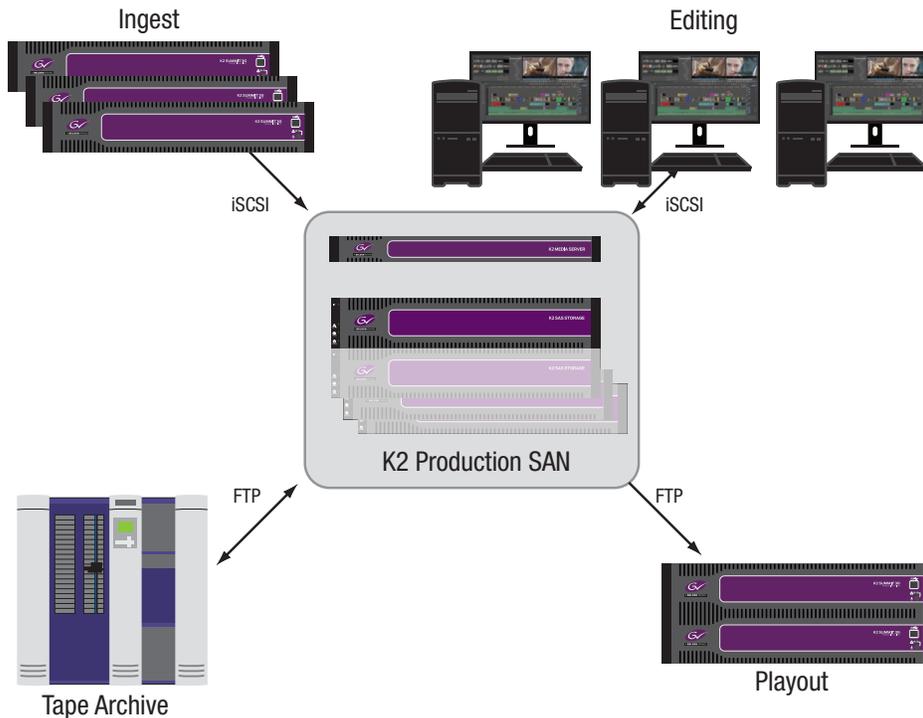
Figure 3 – For direct-attached K2 clients with larger stand-alone storage requirements, a RAID system can be connected with up to 864 TB of raw RAID-protected external storage, without requiring a SAN.



## K2 10G Shared Storage

### Typical Production SAN for Ingest and Editing

**Figure 4** – For ingest and editing applications, a production version of K2 10G storage is available with higher capacity 7.2k SAS drives. This works well for use cases where content is ingested and then edited in a shared environment. To accommodate editing systems and to increase performance, write caching is activated. When material is finished, it is pushed via file transfers to another K2 system for playout. Specifically, production storage is made up of K2 Summit servers for ingest, NLEs for editing, and distributed K2 Summit servers for playout.



### SPECIFICATIONS

#### Server Chassis Specifications

##### Power Requirements:

Voltage: 110/220V  
Frequency: 50/60 Hz  
Consumption: 670 W

##### Dimensions and Weight:

Height: 1 RU, 43 cm (1.7 in.)  
Width: 45 cm (17.6 in.)  
Depth: 77 cm (30.4 in.)  
Weight: 16.3 kg (35.8 lbs.)

##### Environmental:

Operational temperature: 10°C to 35°C (50°F to 95°F)  
Operating relative humidity: 20% to 80%  
Operating maximum vibration: 0.25G  
Operating altitude: -16m to 3,048m (-50 ft. to 10,000 ft.)

#### Redundancy:

System drives: Yes  
Power supplies: Yes  
Cooling/fans: Yes

**10 Gb/s iSCSI Ports:** 1 on K2 iSCSI servers

**10 Gb/s FTP/CIFS Ports:** 1 on FTP/NAS heads

**1 Gb/s FTP/CIFS Ports:** 1 on K2 iSCSI servers

**8 Gb/s Fibre Channel Ports:** 2

#### RAID Chassis Specifications

##### Power Requirements:

Voltage: 110-240 VAC ±10%  
Frequency: 50/60 Hz  
Consumption: 660 VA/640W  
Primary chassis power: 2,118 BTU/W  
Expansion chassis power: 1,470 BTU/W

#### Dimensions and Weight:

Height: 2 RU, 86 cm (3.4 in.)  
Width: 44 cm (17.5 in.)  
Depth: 54 cm (21.3 in.)  
Weight with 24 drives:  
Main chassis: 31 kg (68 lbs.)  
Expansion chassis: 29 kg (64 lbs.)

#### Environmental:

Operational temperature: 5°C to 40°C (41°F to 104°F)  
Non-operating temperature: -10°C to 60°C (14°F to 140°F)  
Operating relative humidity: 10% to 80%  
Non-operating relative humidity: 5% to 80%  
Operating maximum vibration: 0.25G

#### Redundancy:

Power supplies: Yes  
Cooling/fans: Yes  
Controllers: Optional  
Fibre Channel interface: 2 X 8 Gb/s ports

#### Drives per Chassis:

12 X 3.5 inch drives per chassis for production and nearline storage with 7 expansion chassis. Total drives=96  
24 X 2.5 inch drives per chassis for online and direct attached storage with 3 expansion chassis. Total drives=96

**Total drives per controller:** 144

**Expansion chassis per controller:** 11

**Cache memory:** 4 GB

#### Bandwidth:

Total: 100-800 MB/s  
FTP/CIFS: 100 MB/s

### ORDERING

#### Servers

##### K2-SVR-100/200/300/400/600/800

Scalable K2 Media Server. Model number determines MB/s of available bandwidth

##### K2-SVR-PLUS100

License-only option to upgrade server bandwidth in increments of 100 MB/s to 800 MB maximum

##### K2-NL3-480R

Nearline system. Includes two servers and redundant RAID controller with 12 RAID-6 4 TB drives

##### K2-NL3-720R

Nearline system. Includes two servers and redundant RAID controller with 12 RAID-6 6 TB drives

##### K2-SVR-NH10GE

FTP, NAS head 600 MB/s server with 10 Gb Ethernet interface to expand file transfer bandwidth

#### Storage

##### K2-ONL3-600/1200/1800

Standard, redundant, expansion 8 Gb RAID chassis with 12 or 24 RAID-5 or RAID-6, 600 GB, 1.2 TB or 1.8 TB SAS 2.5" online drives

##### K2-PRO3-2000/4000/6000

Standard, redundant, expansion 8 Gb RAID chassis with 12 RAID-6, 2 TB, 4 TB or 6 TB SAS 3.5" production drives

##### K2-NL3-240-EXP

Nearline expansion 8 Gb RAID chassis with 12 RAID-6, 2 TB SAS drives

##### K2-NL3-480-EXP

Nearline expansion 8 Gb RAID chassis with 12 RAID-6, 4 TB SAS drives

##### K2-NL3-720-EXP

Nearline expansion 8 Gb RAID chassis with 12 RAID-6, 6 TB SAS drives

#### Switches

##### K2-SWE-24/48-H-3

24- or 48-port Gigabit Ethernet switch

##### K2-SWE10GB-SFP4

4 10 Gb ports for 24- or 48-port Gigabit Ethernet switches

##### K2-SWFC-8G8/20-Q

8- or 20-port 8 Gb Fibre Channel switch

##### K2-SWFC-8G4-UPG-Q

4-port expansion kit for 8-port switch to 20-port maximum

## Global Services

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

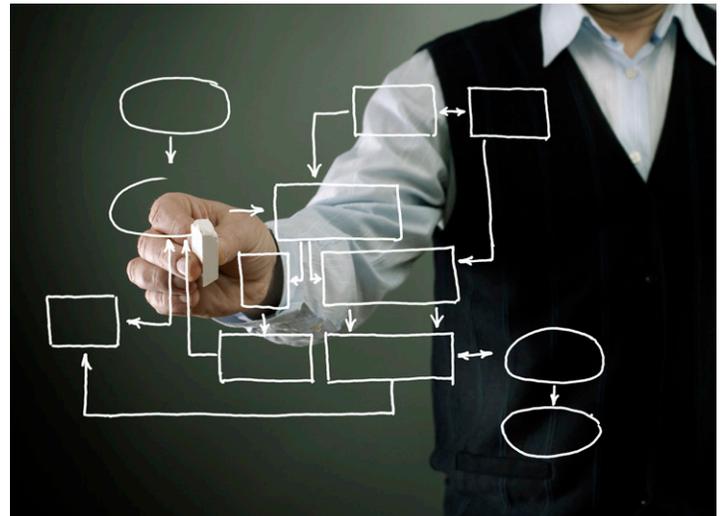
Grass Valley insures the best use of K2-based systems by personally handling the initial setup and commissioning. Field engineers have the experience, knowledge and skills necessary to bring a variety of systems to life—both as product sets, and in the broader context of complete solutions.

### 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 center 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:

- Unequaled depth of industry knowledge and technical expertise
- Over 50 years of worldwide experience
- 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
- Address today's challenges and prepare for tomorrow's opportunities

GVB-1-0110K-EN-DS



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