



Using the Grass Valley K2 Solo Media Server in a File-based Graphics Workflow with a Range of Production Switchers

Jim Pierson, Technical Sales Support Engineer Grass Valley, a Belden Brand — July 2010

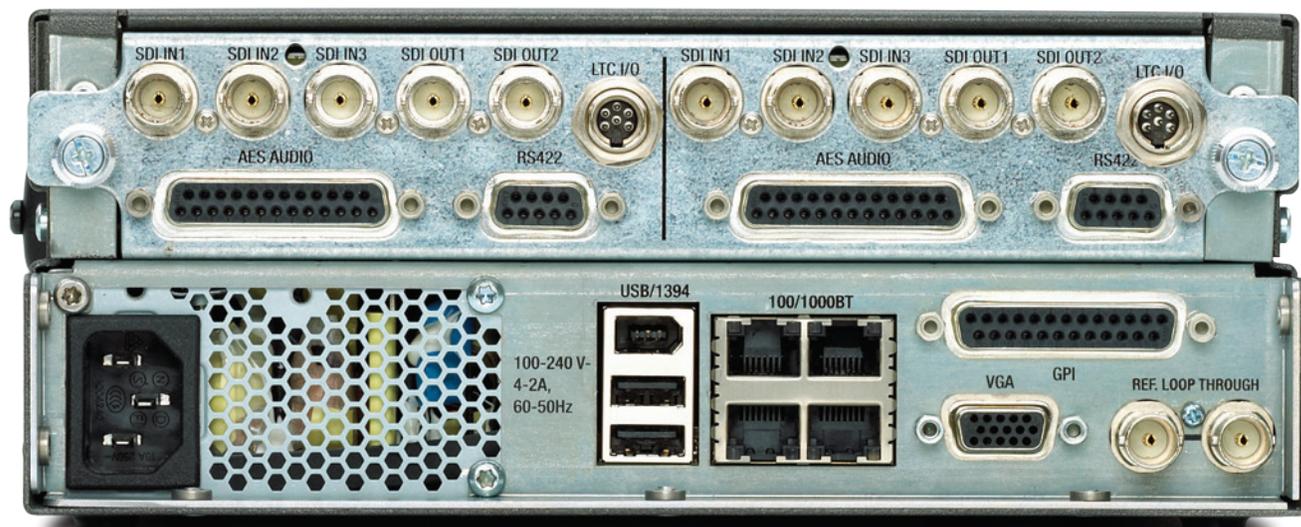


TABLE OF CONTENTS

3.

Introduction

4.

Content Creation

4.

Delivery and Loading Content into Servers

5.

Controlling Server Playout from Production Switchers

5. Example:

6.

Appendix: Technical Setup

6. K2 Solo – Using AppCenter to Build Multi-element Clips

9. Using K2 Solo with Grass Valley Switchers

10. Using K2 Solo with the Sony MVS 8000 Switcher

10. Philips/Thomson XtenDD

Introduction

Many organizations are investigating the feasibility of changing the delivery of graphics from their current tape-based system to a file-based solution.

Moving from a tape-based workflow to a file-based workflow provides both cost savings and enhanced production techniques. In a tape-based workflow, the graphics are copied onto videotapes, transported to the truck or studio, dubbed from tape into the replay device, and then trimmed to ensure that all elements start and finish in sync.

A file-based workflow is simpler and more efficient because the fill, keys and audio tracks are transferred as files from the graphics system directly to the server. The Grass Valley K2 Solo server can be placed under the control of the production switcher and the graphics played in sync in full HD using macros and E-MEMs.

A file-based workflow removes the dependence on well-maintained VTRs and tape stock, the need to transport copies of tapes to every location and the dubbing, assembly and trimming on the final playout device. Graphics retain their original HD quality compared to the generational loss of copying onto tape and from that tape to the final replay device on location. Files can be easily sent as e-mail attachments or via FTP making delivery simpler, quicker and less expensive than tape.

The K2 Solo server is smaller and lighter than a VTR and does not require routine maintenance or alignment. It interfaces to the production switcher using standard protocols on either RS-422 or Ethernet. This is particularly important where one single device is adopted across all facilities owned or hired by the customer. As production moves from SD to HD and from HD to 3D, file-based workflows are proving to be simpler, cheaper and are delivering consistent high-quality results.

The two bi-directional channels in the K2 Solo can be ganged together so that just one set of controls dictates the action of both channels. This is particularly useful for playing out key and fill signals for sports wipes.

Additionally Grass Valley offers ChannelFlex — this powerful software option is available as part of the AppCenter Elite package and converts each one of the K2 Solo's two bi-directional channels into two locked players, two locked recorders, or a super slow-motion channel. In this way, you can configure four record, or four playback, or two record and two playback, or super slow-motion processing and playback — all in one half-rack-width box only 2 RU high.

The K2 Dyno replay controller can be used with a K2 Solo, with Channel Flex installed, to provide a compact HD replay system for tennis, motor sports, or other high-speed live events with either standard-speed or super slow-motion cameras.

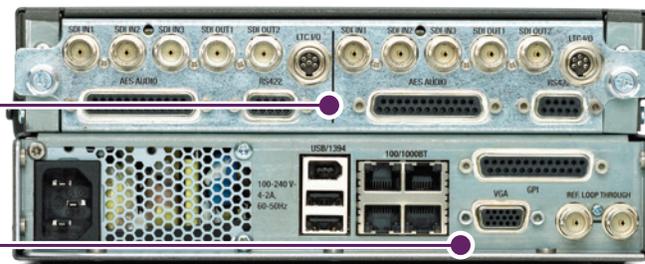
ChannelFlex — via AppCenter Elite — can be added to any existing K2 Solo with a simple license key, while K2 Dyno is a hardware controller that connects to the K2 Solo over Ethernet.

Other vendors have individual products that can play key and fill in sync, or provide super slow-motion replay, or are small portable SD and HD disk recorders. But only the K2 Solo combines all of these features in one low-cost device with the choice of control protocols (AMP, VDCCP, BVW) and compression formats (DV-100, MPEG-2, XDCAM HD and AVC-Intra).

K2 Solo is available with ChannelFlex and AVC-Intra compression (AVC-I 50 and AVC-I 100) as the K2-SOLO-ELITE. AVC-Intra 100 provides the highest quality video performance, combining a full 1920 x 1080 image size with 10-bit 4:2:2 sampling.

Two-channel codec module: With ChannelFlex, each channel can record 2 camera feeds or 1 Super SloMo 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 for control.

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



Content Creation

The various elements of the content will be created using graphics software such as Adobe Creative Suite or Final Cut Studio. Once the content has been created and approved it is copied as full broadcast quality files to the K2 Solo. This could be in an 8-bit format such as DV-100, or a 10-bit format such as AVC-Intra 100. The idea is to use the same compression in the creative process as K2 Solo will use to play back the clip, to preserve quality. So for a typical sports wipe to go into a slow-motion replay, the graphics artist will produce a short, (e.g., 20-frame) fill element, one or two key elements that have the same duration as the fill element and finally the audio elements which could be simple 2-track or more likely the components of a 5.1 surround sound:

- TK 1 – Front Left
- TK 2 – Front Right
- TK 3 – Center
- TK 4 – Sub
- TK 5 – Left Surround
- TK 6 – Right Surround

K2 Solo provides both embedded and AES/EBU audio, with up to 16 audio tracks per video clip.

Each of the key and fill elements are exported from the graphics system in the chosen compression and aspect ratio inside a wrapper, typically as a QuickTime movie. Audio is exported as two or six individual 48K PCM .WAV files.

These elements are imported as a batch directly into the K2 Solo. Then by using the “Add Tracks” feature inside the K2 Solo’s Application Center, the various components are added together to build the sports wipe (see Appendix). In this way, all elements are assembled in sync and there is no subsequent trimming required.

K2 Solo typically supports two video elements, timecode and 16 audio elements inside each clip, thus providing key and fill as well as 5.1 audio in a single clip. When the clip is to be played back, the K2 Solo can use either two bi-directional channels ganged together for playback, or one bi-directional channel with the ChannelFlex option set to “Key + Fill” for playback of all of the clips in sync.

Delivery and Loading Content into Servers

Although the preferred method of loading content into the K2 Solo would be from a shared network drive on the corporate network, with a 20-frame key or fill element in DV-100 compression being only around 10 MB, elements could be distributed to multiple K2 Solo users by e-mail and then uploaded directly into the K2 Solo via USB.

For late breaking stories or urgent changes, elements could even be sent to a Blackberry or iPhone on location and uploaded from there into the K2 Solo.

Controlling Server Payout from Production Switchers

The K2 Solo server has the ability to work with a wide range of production switchers, not just those manufactured by Grass Valley.

Grass Valley switchers support the AMP protocol over serial or Ethernet connection for server control. This Advanced Media Protocol is a development of the Odetics protocol to provide the features necessary for file-based payout.

Some other vendors, such as Snell (formerly Snell & Wilcox), have now decided to support AMP and this provides a much simpler workflow than relying on earlier protocols such as VDCP.

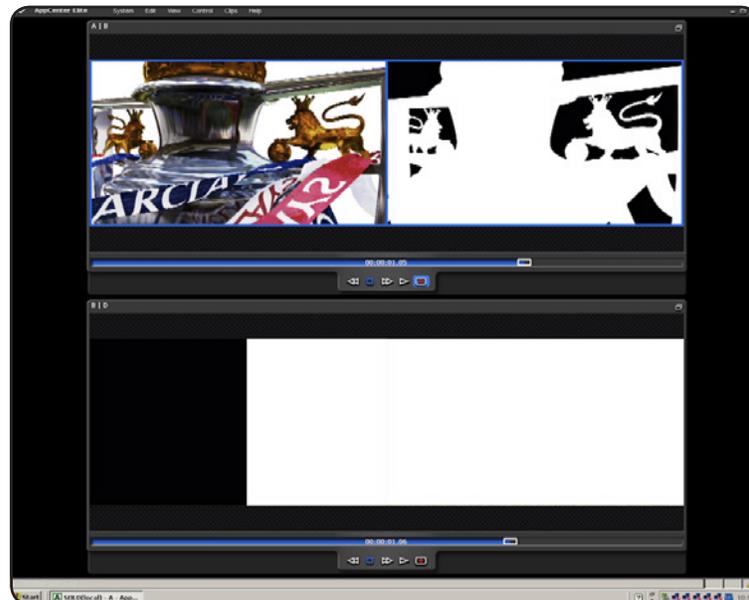
The key differences between VDCP and AMP are AMP's support for both Ethernet and serial control and AMP's extensive list of commands for file-based payout servers that enhance cue and playback performance.

For most sports production companies, the K2 Solo's ability to interface to Sony, Grass Valley, or Snell switchers is essential, as the trucks or facilities they hire could contain a switcher from any of these major vendors.

In the Appendix at the end of this document there are recommendations for working with Grass Valley switchers together with configuration information for Sony's MVS 8000 and the Thomson XtenDD.

For simple key and fill workflows, all that is required is to use the ganged setting for the two K2 Solo channels and then they will be treated as one device by the production switcher controlling them. The key and fill will then play in sync with one command.

For more complex workflows with more than two elements, the ChannelFlex option comes into play. Using ChannelFlex, each of the K2 Solo's bi-directional channels become two locked players, permitting the production switcher to control four video elements. If more than two elements are required in sync, then a macro or E-MEM is built to control the two ChannelFlex channels as two devices.



Example:

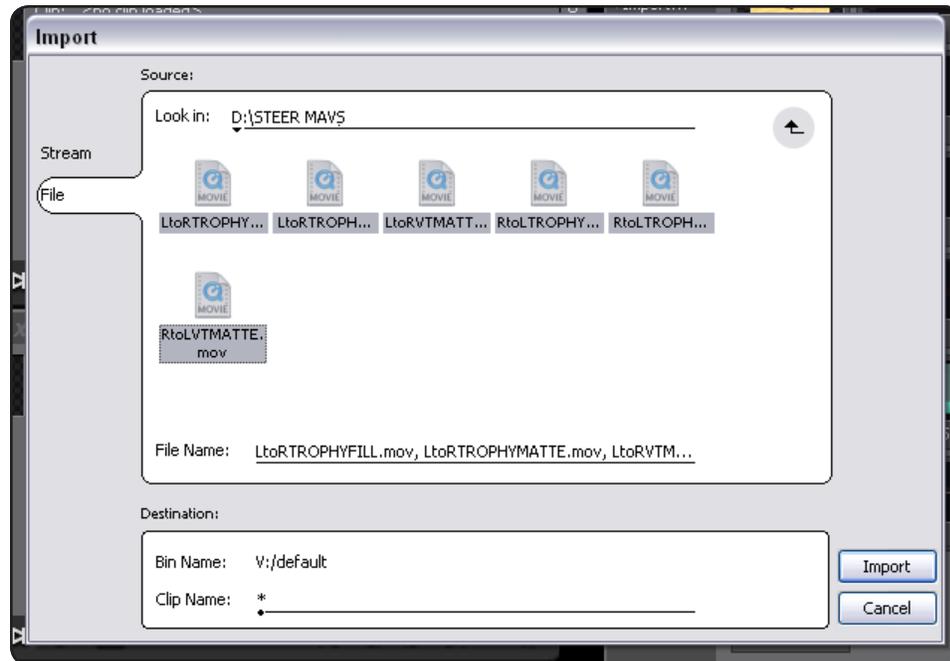
The customer's requirement is for a trophy graphic to fly across the screen from right to left, a key to cut the flying trophy and a travelling matte to create a wipe as the trophy passes across. To achieve this we first create the trophy clip from the fill, key, and music as a clip with two video elements, then load this into the first ChannelFlex pair, controlled from one media device on the switcher. The travelling matte is loaded into the first channel of the second ChannelFlex pair, controlled by the second media device on the switcher. Then we build an E-MEM to trigger both to play at the same time.

In this way, ChannelFlex allows the K2 Solo to be used for more complex three- or four-element wipes. With the advent of 3D production, this means that the K2 Solo with ChannelFlex is ideal for playing 3D wipes with the first ChannelFlex pair running the key and fill for the left eye and the second ChannelFlex pair running the key and fill for the right eye.

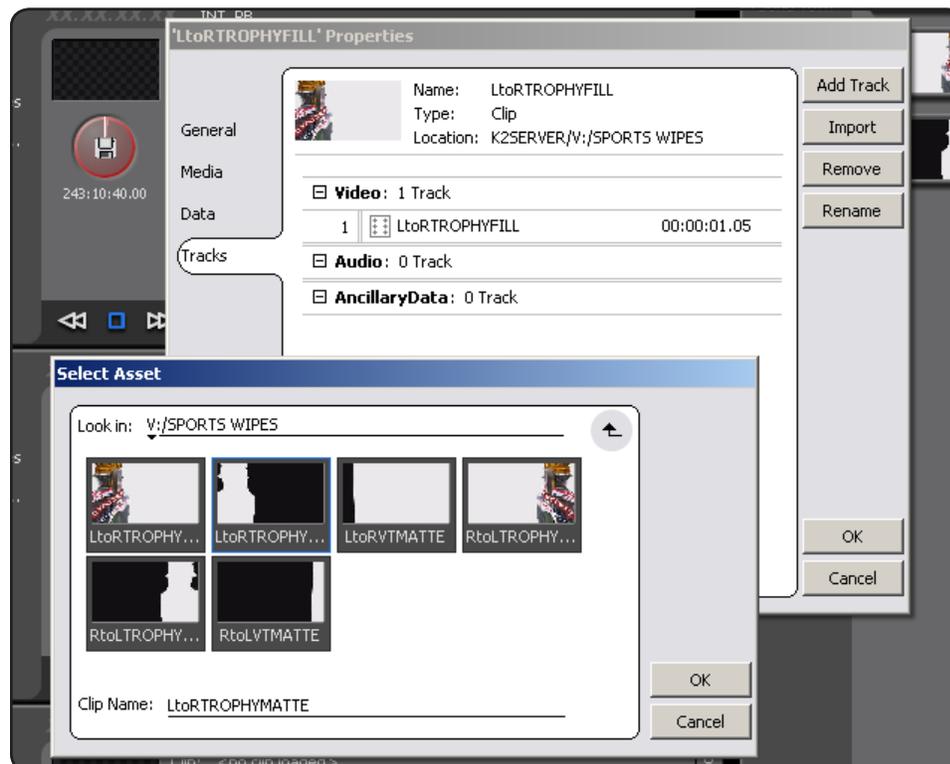
Appendix: Technical Setup

K2 Solo – Using AppCenter to Build Multi-element Clips

AppCenter – Import multiple elements to bin.

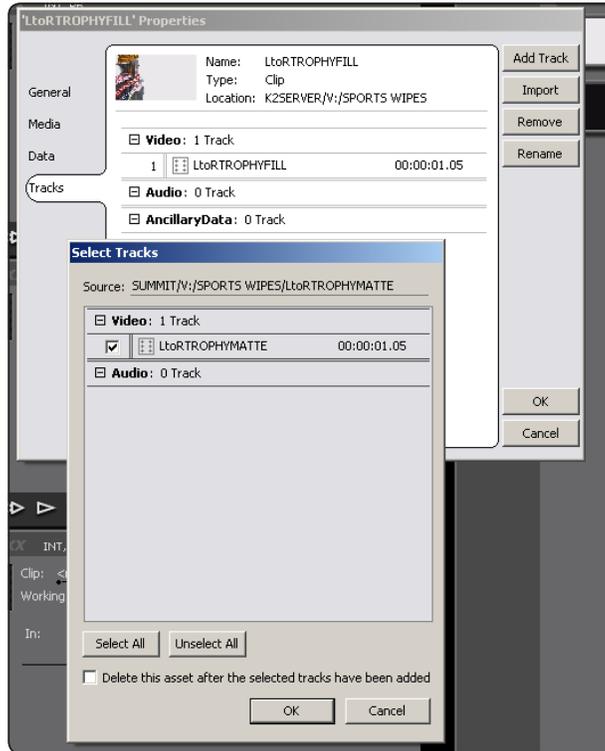


AppCenter – Select source clip for tracks to be added.



Appendix: Technical Setup (Cont.)

AppCenter – select audio and video tracks to add.

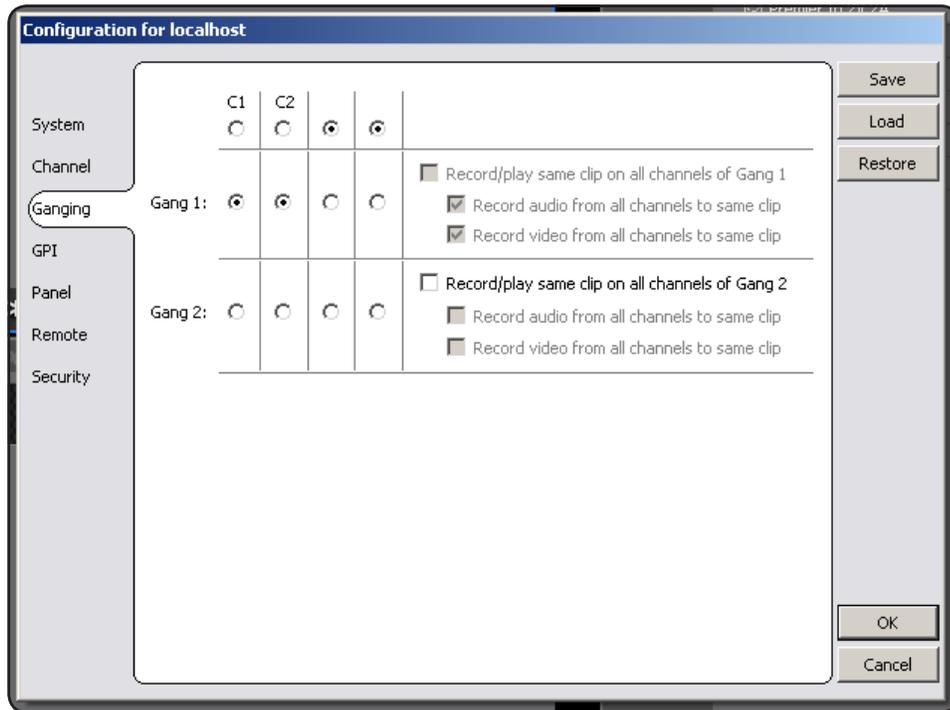


AppCenter – finished clip with fill, key and six audio tracks.

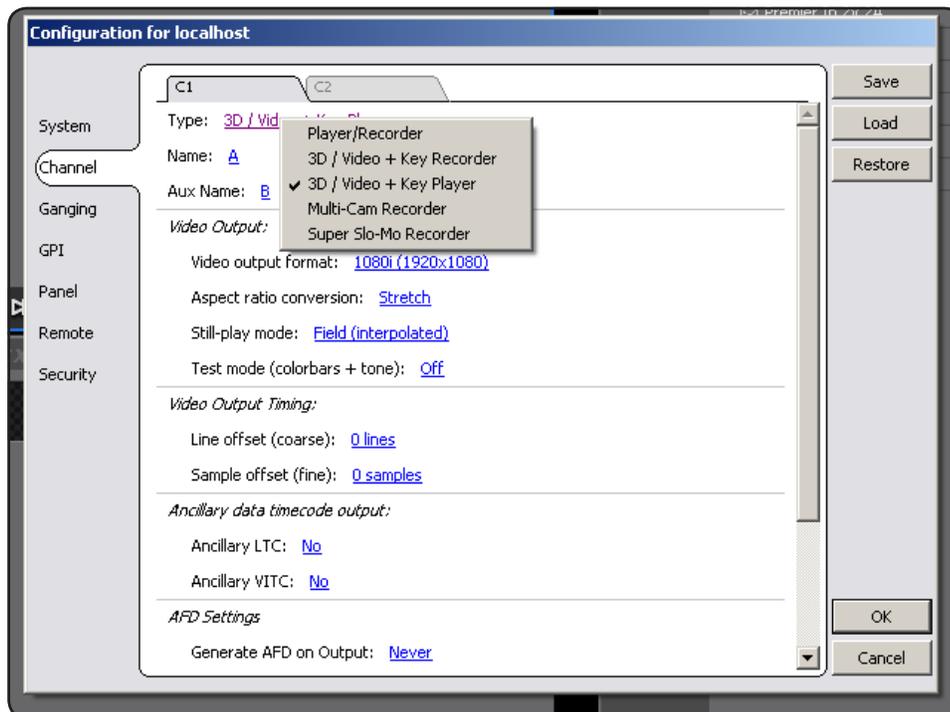


Appendix: Technical Setup (Cont.)

K2 Solo – Gang the two bi-directional channels together.



K2 Solo – ChannelFlex settings for key and fill playback.



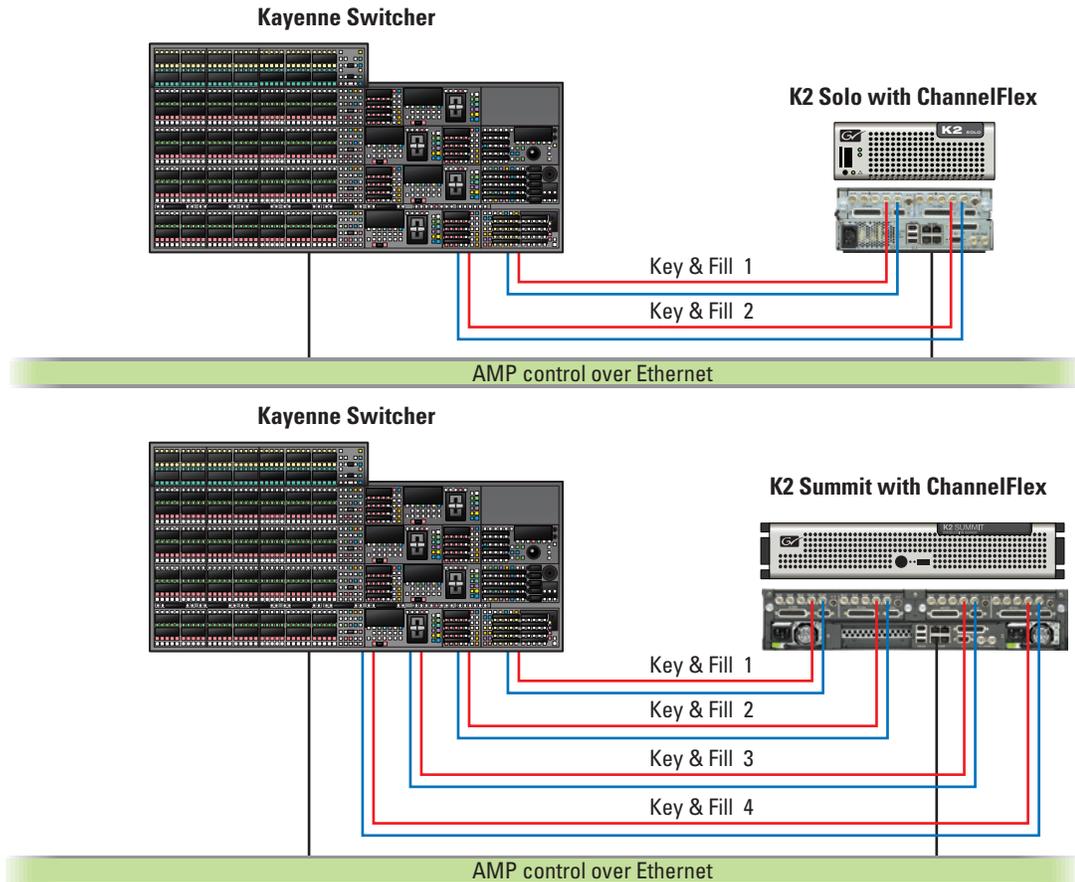
Appendix: Technical Setup (Cont.)

Using K2 Solo with Grass Valley Switchers

When using the K2 Solo server with Grass Valley production switchers such as Kayak, Kalypso, or Kayenne, always select the AMP over Ethernet protocol for optimum performance. AMP over Ethernet provides full handshaking between the production switcher and the controlled device, allowing a sequence of instructions to be buffered while the server carries them out. There are very few settings for AMP over Ethernet control, however DO NOT select TAPE TIME, select AUTO or one of the other settings as appropriate. TAPE TIME will cause control issues.

To control the two basic or the two ChannelFlex channels of a K2 Solo server, use the same IP address but give each “player” a different name in the production switcher setup — for example SOLO-1 and SOLO-2. Grass Valley uses a hyphen and number to indicate multiple players controlled from the same IP address.

For the Kayenne Video Production Center switcher, the Kayenne ClipStore option with either the K2 Summit (4-channel) or K2 Solo (2-channel) server provides up to four video/key pairs (two with K2 Solo) and over 10 hours of non-volatile video/key/audio clip content. To streamline workflows, the K2/ClipStore has been tightly integrated into the native ImageStore, so both can be transparently controlled from the Kayenne touchscreen GUI and main control panel. Because they are full bandwidth channels, when not in video/key mode, the same device can record or play left eye/right eye video sources for stereoscopic 3D.



Appendix: Technical Setup (Cont.)

Using K2 Solo with the Sony MVS 8000 Switcher

Sony does not support the AMP protocol, so select VDCP to work with the K2 Solo. The MVS 8000 device menu then offers a series of delays for various parts of the VDCP protocol to get optimal performance with the K2 Solo.

Sony has done a great deal of work to improve the VDCP performance since version 7 and Grass Valley recommends using the partial release 8.10.2 or the full release 9 software.

With Sony's 8.10.2 software the performance should be:

- K2 Solo in Ganged mode — Cue time of just under 1,000 milliseconds for the key and fill movies and from pressing the Play button to the clip playing around 800 milliseconds.
- K2 Solo in ChannelFlex mode — the Cue time will remain the same, however the latency from issuing the Play command to the clip playing is reduced to around 400 milliseconds.

Macros – There is an issue with spaces within filenames being omitted when editing Macros in both versions of Sony software. The underscore, minus (hyphen), and plus symbols all work fine and can be used as an alternative to blank space. The maximum number of characters the MVS 8000 will recognize in a filenames is 23.

NOTE: K2 Solo can use file names up to 32 characters.

Recommended Settings

Protocol: VDCP

Recommended Connection: Sony RS-422 VTR cable with hardware handshaking

Recommended Serial Port Settings (K2 Solo in Ganged mode):

	Video Port	1 (ESSENTIAL!)
1		
2	Maximum Open Delay	15
3	Maximum Cueup Delay	1
4	Play After Cueup Delay	8
5	Stop Delay	1
6	Still Delay	1
7	Continue Delay	1
8	Idle Delay	20

Philips/Thomson XtenDD

Desk Software HD: 692, SD: 492

Recommended Settings

Connection Method: AMP serial

K2 Solo configuration: Two bidirectional channels ganged

Recommended Connection: Sony RS-422 VTR Cable with hardware handshaking

It is essential when building Macros with short clips to allow 0.4 seconds for the device to cue up, any less can cause the key and fill channels to play out of sync. As long as this queue duration is respected, performance is solid and reliable.

There are no appreciable differences in performance in ChannelFlex mode.

Filenames

Although the XtenDD will recognize long (32 character) filenames, the on-screen menu display is limited to 22 characters.

Controller Pin Name	Controller Pin	Direction	Device Pin Name	Device Pin
Ground	1	—	Ground	1
Receive A	2	←	Transmit A	2
Transmit B	3	→	Receive B	3
Transmit Common	4	→	Receive Common	4
Spare	5	—	Spare	5
Receive Common	6	←	Transmit Common	6
Receive B	7	←	Transmit B	7
Transmit A	8	→	Receive A	8
Ground	9	—	Ground	9

