

WHITEPAPER

K2 Dyno Replay System

Matt Allard, *Director of Marketing, Servers & Digital Production*

September 2011

Live event production requires a sophisticated replay system that can fully leverage today's file-based infrastructures to deliver more than just "record and play." Replay systems should take full advantage of IT-centric open systems, being able to run on stand-alone servers or complex SAN systems with advanced metadata capabilities, while also being easy to use by operators.

Introduction

Live event production is going through an important transformation from linear, tape-based operations, to true file-based workflows with all of the flexibility that the term implies. Therefore it is important when choosing a replay system that it meets the changing needs of production environments.

Up until now, even systems that recorded audio and video to disk mimicked tape operations because they failed to provide the networked connectivity required for true file-based environments. Today, a modern replay system should be based on a platform that is already

proven for file-based production in other applications such as playout, ingest, editing, clip stores, and news. The architecture and infrastructure should offer the best integration into file-based environments.

For proper integration, a complete replay system must be based on a modern and sophisticated server platform. In addition, it's preferable to work with a supplier that also has extensive live production experience with other products such as switchers, routers, and cameras.



Technology Integration

Open standards for integration and storage should be included in a replay system. A proprietary system will be expensive, limited, hard to expand, and will tie the user to one vendor for everything. Adherence to IT technology optimization, industry standards, and platform openness provides better value.

Some technologies that should be included in a replay system include the use of current generation embedded and real-time operating systems, multi-core CPUs, CompactFlash-based booting, firmware-based codecs, and multiple USB connectors. Gigabit Ethernet

networking should be an obvious requirement, but it should also include managed quality of service, and guaranteed bandwidth networking not only to other replay systems but to external systems as well. There should be separate networks for control and for file transfers. There should not be a requirement to buy additional hardware/software components to make a replay system easy to integrate. Being integrated with a truly open platform also means that the replay system should have versatile, robust APIs that enable a diverse group of third-party developers to create unique solutions that complement replay operations.

Storage

Storage integration is always a primary factor of a replay system. The best performance comes from use of 15K SAS drives with capacity such as 600 GB. While high density in a small form factor, such as 2 RU, is sufficient for most uses, a system should be able to add capacity with external drives as well.

The storage industry offers a wide variety of off-the-shelf portable storage products. A system should provide USB and Ethernet connectivity to permit the use of different non-proprietary solutions including portable NAS storage devices that can be mapped as a system drive.

For more advanced scenarios, a replay system should be able to work in a SAN configuration. A proper SAN implementation should provide managed bandwidth for simultaneous record, playout, replay, editing, and file transfers. A small SAN should fit in 10 RU and provide up to 12 HD record and two play channels, and still have bandwidth for editing-in-place and for simultaneous file transfers.

With a SAN, all highlights, playlists, and metadata created by one operator should be immediately available to all other operators. Also, any operator should be able to temporarily take control of any other channel being used by any another controller with no loss in performance or resolution.

System Interfacing

To permit simple integration with other systems, a replay system should support standard file wrappers such as MXF and MOV QuickTime. Other useful interchanges include the import of AVI and MPEG video files, WAV audio files, QuickTime 32 graphic files, along with the export of P2 files.

A common production need is to interface with various edit systems. Content should be able to be shared with editors from Avid, Apple, and Grass Valley with no special equipment or processes. By using common file types, the replay system should be able to transfer material to and from such systems. With an appropriate production SAN, these editors can be connected as clients and support direct editing in place without time consuming transfers from the replay systems.



Ease of Use

A perceived issue with replay systems is the need for specialized operators. This is because traditional replay systems have not been user friendly and require extensive training. A system should be intuitive to use and need minimal training for on-air use. With a system that is easy to use and provides good user feedback, production professionals who are creative and know the dynamics of an event can quickly be trained as skilled operators. Interfaces should include colors, icons, touchscreens, and VGA displays. With a good software application, the vast majority of users learn a system quickly

to do common, repeatable tasks. From user feedback, there should be improvements of the system with new releases of software to make it better and offer new capabilities. By being flexible and easy to use, a replay system can fit into diverse environments. The replay spectrum includes videotape machines which are swiftly approaching obsolescence not only in outside broadcast vehicles but also in studios. A replay system with good interface design makes it easy for professionals from diverse backgrounds to feel comfortable making the transition for whatever their application might be.

Form Factor and Ergonomics

Especially in mobile environments such as OB vans, space, power, and cooling are all vital concerns. The server component of a replay system should take this into consideration. Channel density becomes a highly desirable factor. The server should be able to support channel counts of seven or eight in 2 RU of space. All major components should be easily accessible and removable from the front or rear of the unit without taking the device out of the rack.

The operator control panel should not be merely robust, but it should incorporate modern interface design and components in an elegant manner. As most professionals regularly operate devices such as personal computers and tablets, the replay control panel should integrate elements common to those usual appliances. These elements should include a keyboard, mouse, and VGA display. Interfaces should incorporate colors, icons, and other visual user feedback. A primary tactile supplement to the visual aspects of user interaction should be a touchscreen integrated into the control panel.

Content Management

As productions move more and more towards file-based workflows, being able to manage content and enhance it for re-use is increasingly important for replay systems. It should be fast and easy to select material and import/export it. It should be possible to aggregate content into different bins and send to other connected systems, removable storage, or network destinations.

Metadata is now another important aspect of file-based production. The inclusion of descriptive metadata into the live production process can provide for additional revenue. Metadata enables the re-use of valuable content. Users should be able to create metadata frameworks off-line in advance in order to quickly tag information such as names and relevant event action types.

Such metadata should be distributed and imported as XML data attached to clips. A replay system must include the ability to easily enter metadata at the time of acquisition directly through the control surface. Clips should be given text names with text metadata added during the event along with ratings and icons. Once metadata is created and attached to content, it must be managed, appended, and transferred. Such metadata must be shared and preserved. The metadata must be made available to other systems such as editors, archives, and asset management systems.

Media Capabilities

Common video formats such as DV, XDCAM, and AVC-Intra should be supported for both HD and SD resolutions in a replay system. Proprietary codecs limit interoperability and should be avoided. The system should have the ability to play back-to-back clips of different resolutions, aspect ratios, and compression formats in a single channel. This is important because even though an event is recorded in a single format, the production may need to include archival material or content provided from other sources. There may not be time for transcodes or conversions. The system must be able to change video type, HD/SD resolution, and 1080i/720p formats with just software settings and no re-boots.

A replay system should do effects in a single channel on all output channels. Full control must be permitted of

each output channel so there can be different playlists being output at the same time.

The input video channels should be flexible on a replay system to switch between single, multicam, super slow-motion, 3D, or video/key in a single channel with just software settings.

For audio, there should be a choice of embedded or discrete AES audio. There should be delay settings for working with Dolby, audio click filtering, and software audio gain adjustments that are savable along with clips.

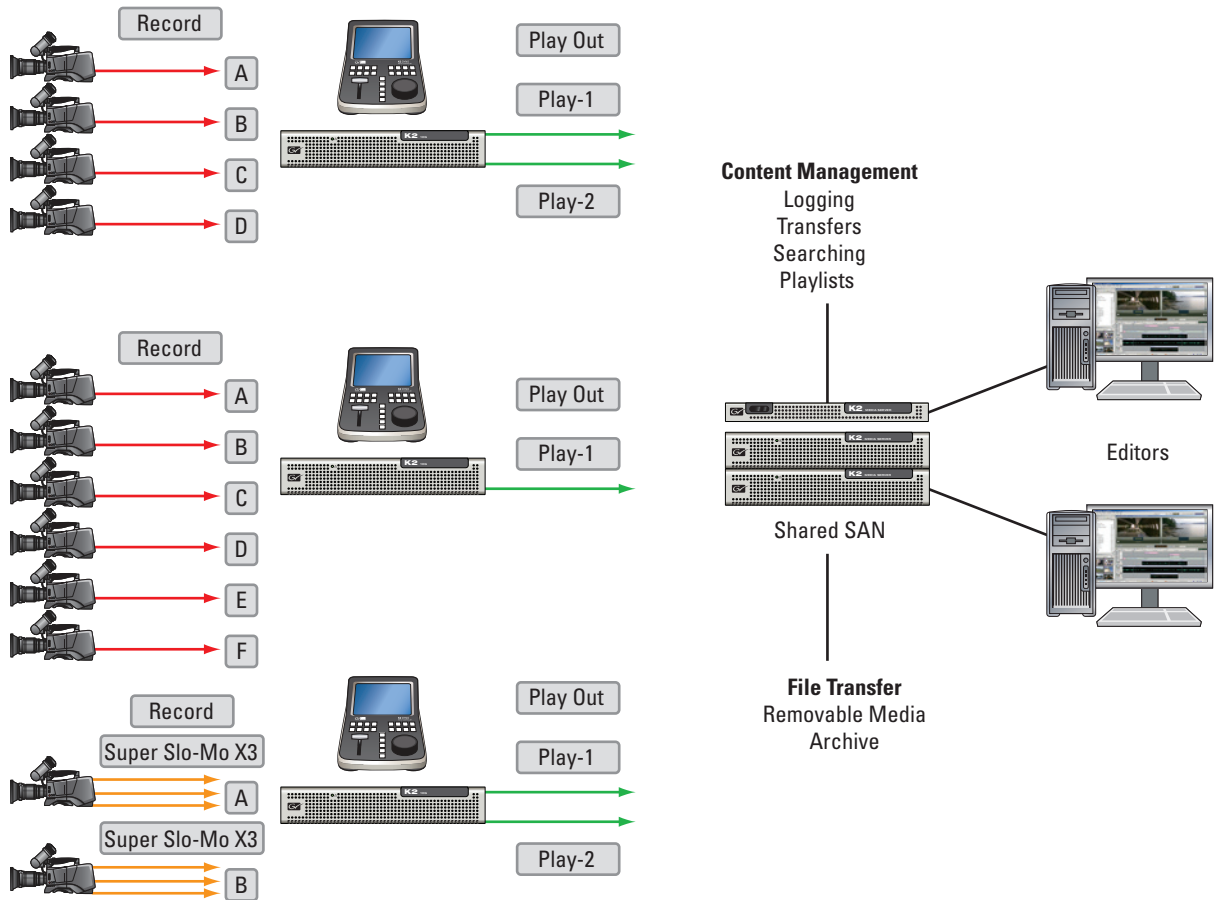
Monitoring is an important consideration with a replay control system. Each replay position should have an integrated VGA multiviewer. There should be selectable on-screen status data for both the VGA as well as SDI video outputs.

Conclusion

As live event production continues to evolve and incorporate file-based methodologies, a replay system must be chosen that integrates the latest IT technologies and optimizes them for real-time media requirements. It should occupy the least amount of rack space and economize on cooling and power needs. It should include common connectivity, networking, and file import/export.

For users, it should be intuitive, easy to learn, and offer extensive operator feedback.

As videotape machines are being replaced by servers in production, a replay system should be chosen that best reflects this same transition.



SALES

Local and regional sales contacts can be found by visiting www.grassvalley.com/sales

SUPPORT

Local and regional support contacts can be found by visiting www.grassvalley.com/support

Join the Conversation at **GrassValleyLive** on Facebook, Twitter, and YouTube.

