

Quantum®

WHITE PAPER

HIGH-PERFORMANCE STORAGE WORKFLOWS WITH DATABASE-DRIVEN PRODUCTION MANAGEMENT

Reference Architectures for Quantum StorNext Environments
Featuring Cinegy Software

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ABSTRACT

This document highlights the level of integration between Quantum storage and Cinegy production management systems for broadcast, and media and entertainment environments. It covers the solutions available via the Quantum and Cinegy partnership, and provides several applicable reference architecture designs. The configurations provide a simple description of the products and technology required to fulfill selected media workflow solutions using Quantum and Cinegy products, appliances, and software. For more information on included products, see the appendices.

INTRODUCTION

Quantum StorNext® scale-out storage solutions provide high performance and advanced data management for large data-driven media workloads. The Cinegy software platform provides a comprehensive means of delivering a full media workflow and archive solution for broadcast, and media and entertainment customers. As a combined solution, Cinegy provides all the ingest, edit, archive, and playout tools required for a production or broadcast user at their desktop while StorNext delivers the scalable storage and hierarchical storage management (HSM)—allowing content to be both protected and optimized to provide the lowest possible cost of ownership for large media assets.

The policy engine built into StorNext provides the automated storage and retrieval of content between disk- and tape-based storage devices. Within a production workflow, the combination of StorNext and Cinegy products are most often configured to automatically store high-resolution master assets on tape for archive and low-resolution proxies on disk for day-to-day operations. These solutions can also be configured to enable multiple copies of content to be stored to protect material and aid business continuity and disaster recovery (DR) procedures.

The basic characteristics of the Quantum and Cinegy system include:

- All disk-based storage for shared access is configured as LUNs, which are configured as stripe groups within StorNext.
- Microsoft Windows servers are installed with the StorNext SAN file system client, allowing clients to access content via Fibre Channel. The StorNext file system appears as a local drive on these servers, or as a NAS gateway, which is then shared using SMB over the network via 1-Gb, 10-Gb, or 40-Gb Ethernet connections.
- The NAS head shares (i.e., \\NASHead01\CinegyStorage and \\NASHead02\CinegyStorage) are entered as nodes in a Microsoft DFS root (i.e., \\domain.name\ namespace\CinegyStorage).
- The Cinegy Archive system is configured (via Cinegy Enterprise Manager) to point to the Microsoft DFS root as the system media storage location, and then subdirectories under that are used for the proxies and high-resolution files.
- All Cinegy clients access content via the NAS gateways. The DFS root provides failover and load balancing; if required, additional nodes can be added to the DFS root to scale throughput. Capacity is simply expanded by adding more online disk, archive disk, or tape storage to the StorNext file system.

Figure 1 shows the network and storage architecture used for a high-availability (HA) Quantum and Cinegy installation. All Cinegy applications use storage presented via the NAS heads, regardless of location of that media.

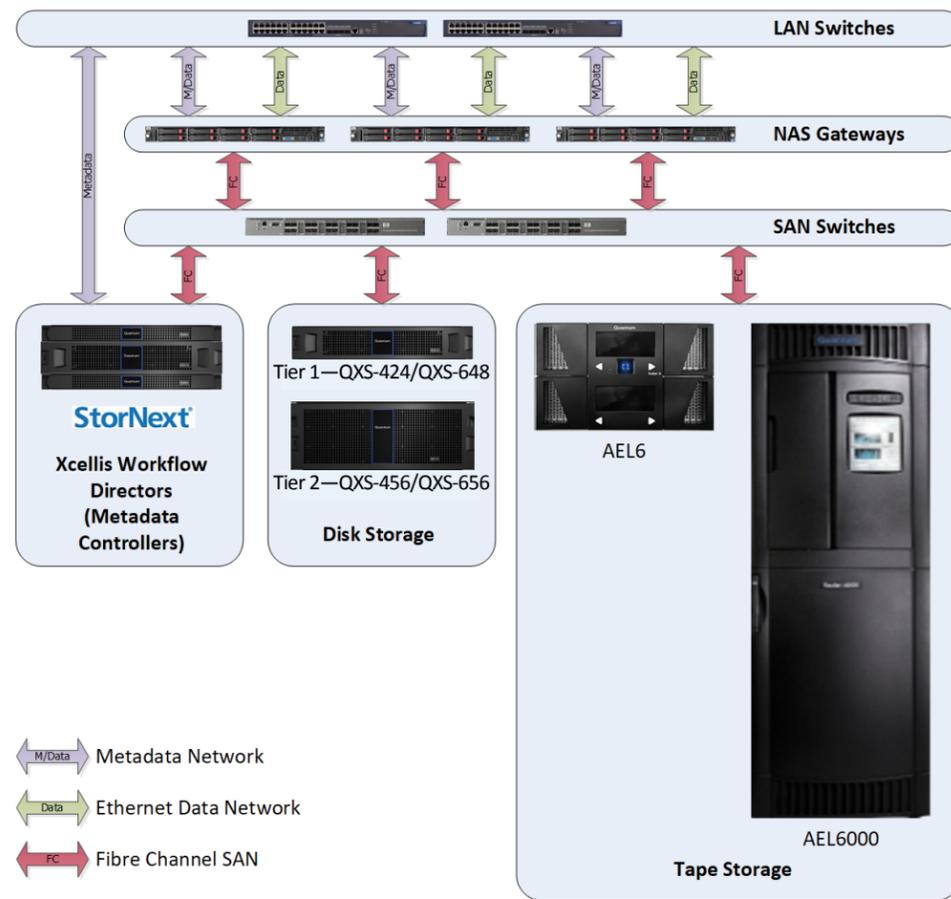


Figure 1. HA disk and tape-based storage infrastructure

REFERENCE ARCHITECTURE DESIGNS

Multiple solution designs are available when using Quantum and Cinegy products, each intended to match the user's workflow and budget requirements. For this document, we focus on common playout and archive installations.

Basic Playout

Many broadcast organizations require basic playout capabilities that can be provided using Cinegy Air and a StorNext disk-only storage layer.

Cinegy Air is a software-based playout automation system for UHD, HD, and SD that uses standard PC server hardware running one or more Cinegy Air Engines. It is managed with the Cinegy Air Control application running on the end user's PC. Single or multi-channel outputs can be configured using a single set of hardware.

Figure 2 shows the design of a basic playout system comprising:

- One Xcellis® Workflow Director appliance with NAS licensing
- One QXS™-424 or QXS-456/QXS-656 disk storage appliance
- One SAN Fibre Channel switch
- One 1/10-GbE LAN switch
- One Windows Server running Cinegy Air Engine
- One desktop PC running the Cinegy Air Control application.

Additional playout channels can be added by adding more Air Engine licenses and servers, as required. This configuration can be expanded to provide additional functionality, such as the Cinegy Archive Media Asset Management (MAM) solution, with no need to change the underlying StorNext infrastructure. Additional storage and licenses can be added as a non-disruptive upgrade.

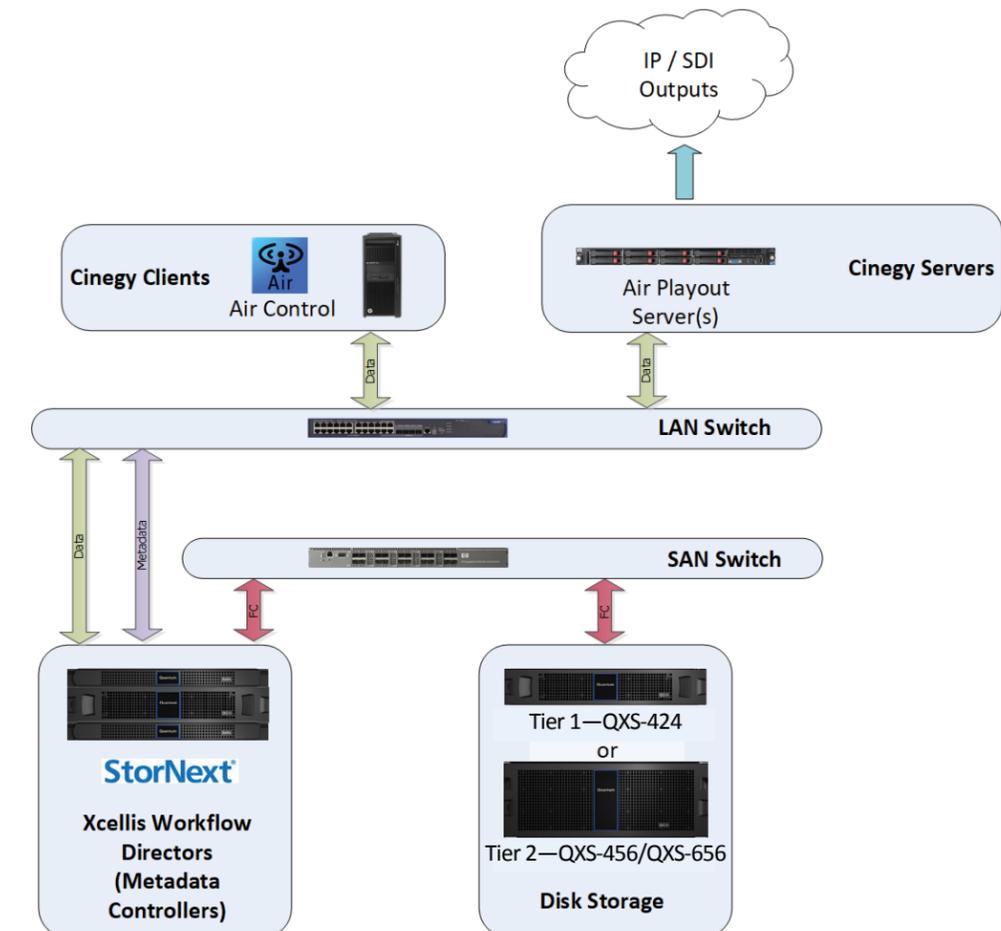


Figure 2. Basic playout architecture with Cinegy Air

High-Availability Playout

Should an increased level of resilience be required for playout, this capability can easily be provided by adding additional infrastructure switches and servers. Cinegy Air can be configured to have a main and standby Air server for automated failover. Figure 3 shows an HA playout system design, where multiple SAN and Ethernet switches can be used to provide separate data and metadata networks.

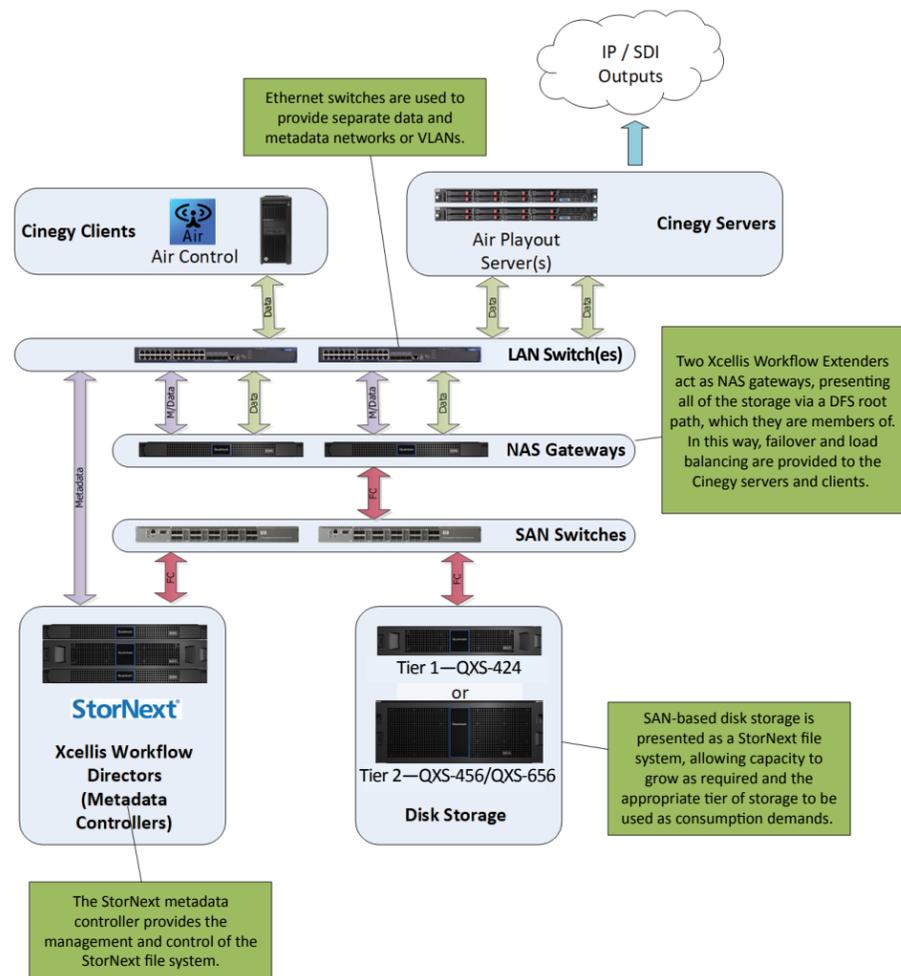


Figure 3. HA payout architecture with Cinegy Air

Basic Archive

Cinegy Archive is a core component of the Cinegy product suite. It provides an extensible MAM solution coupled with associated media-driven applications. The core archive system can provide for the day-to-day production needs of content creators, as well as for long-term cataloging and archive.

A core (disk-only) MAM solution uses the StorNext file system for all content manipulation and storage requirements, and a set of commodity IT equipment for hosting the Cinegy applications. Figure 4 shows the design of a core archive system comprising:

- One StorNext Xcellis Workflow Director appliance with NAS licensing
- One QXS-456/QXS-656 disk storage appliance
- One SAN Fibre Channel switch
- One 1/10-GbE LAN switch
- One Windows Server running the Cinegy Archive (SQL database) and Workspace (web-based MAM) applications
- One Windows Server running the Cinegy Convert transcoding application
- Desktop PCs running the Cinegy user applications and management tools

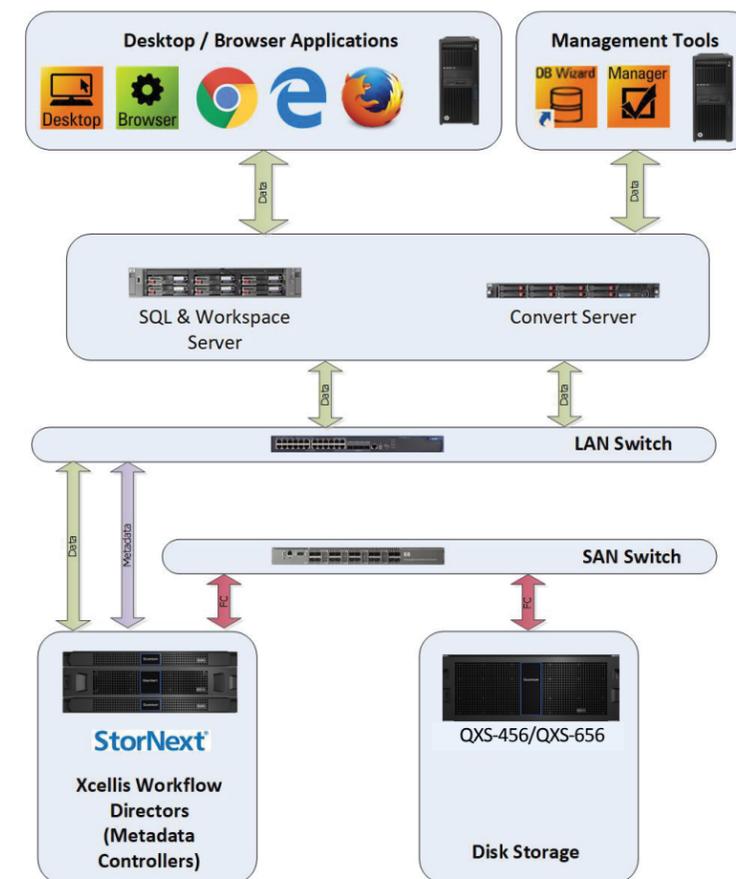


Figure 4. Core Cinegy archive MAM architecture

High-Availability Archive

As with the basic or HA payout solution design, it is possible to expand the archive solution to provide additional functionality by adding more Cinegy products or licenses, and associated IT servers (if required). There is also a seamless upgrade path to move to a managed file system, and thus introduce tiered disk storage and tape into the design. In each case, the user's initial investment in Quantum and Cinegy technology is protected.

Figure 5 shows the solution design for a resilient tiered storage architecture including ingest, playout, transcode, and MAM/archive functionality on a disk- and tape-tiered architecture. This design can be further enhanced by adding a disk-based archive storage tier, allowing for "waterfalling" of content from online disk to archive disk to tape as the requirement and value of those assets decline. Tape-based protection of content is possible at any point in an asset's life cycle with any of these designs.

This solution comprises:

- One StorNext Xcellis Workflow Director Appliance with NAS licensing
- One or more QXS-648 (tier 1) disk storage appliance
- One or more QXS-656 (tier 2) disk storage appliance
- One or more AEL6/AEL6000 archive-enabled tape libraries
- Optional Lattus™ object storage appliance
- Two or more SAN Fibre Channel switches
- Two or more 1/10 Gb Ethernet LAN switches

- Three or more Xcellis Workflow Extenders with NAS licensing (acting as the NAS gateways for all Cinegy applications and users)
- Two Windows SQL Servers running the Cinegy Archive (SQL database) in a Microsoft SQL cluster configuration
- Two or more Windows Servers running the Cinegy Convert transcoding solution
- One or more Windows Servers running the Cinegy Capture ingest application
- One or more Windows Servers providing web-based access to the Cinegy Archive via Cinegy Workspace
- One or more Windows Servers running the Cinegy Air playout automation solution
- PCs providing access to the Cinegy Archive applications and desktop tools
- PCs providing access to control and management applications and tools

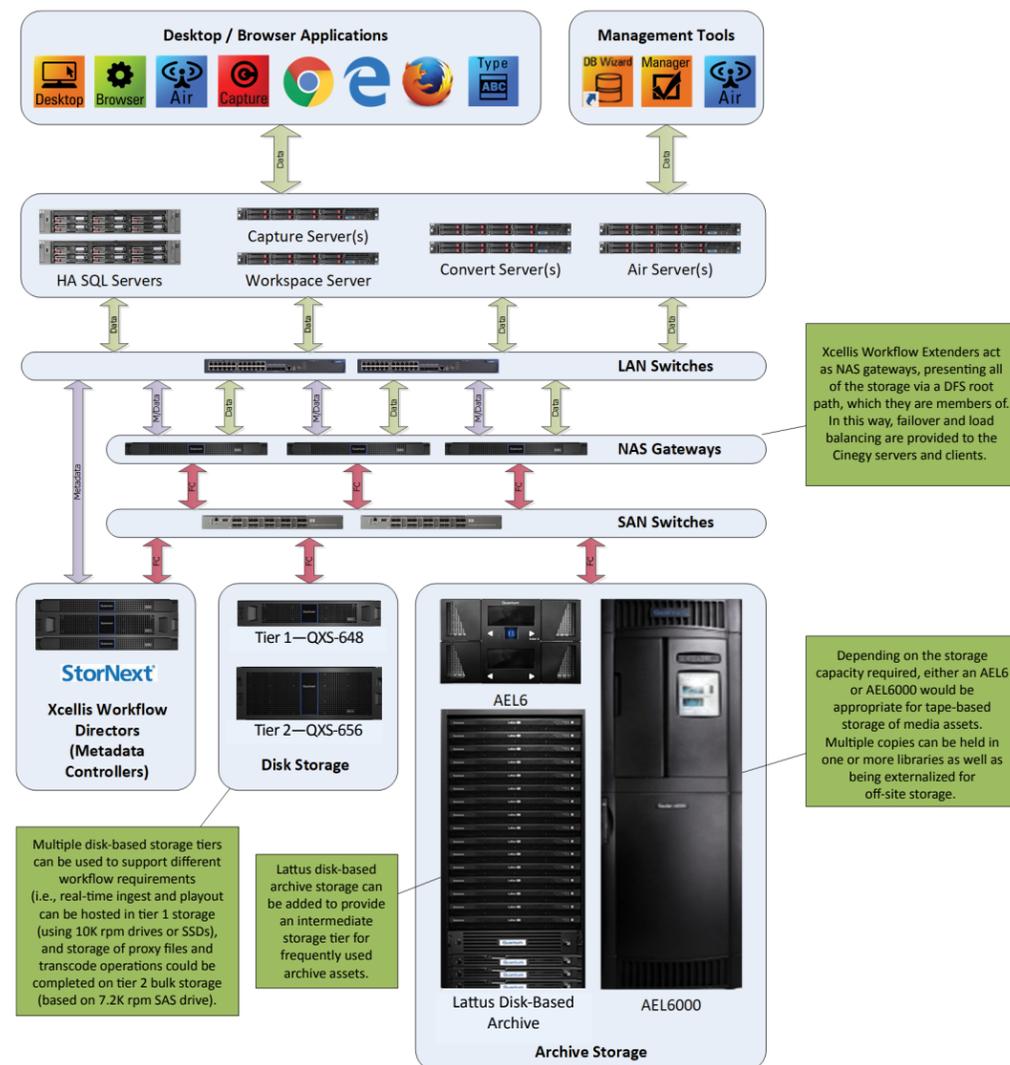


Figure 5. Complete HA Quantum and Cinegy solution design

CONCLUSION

Combining Quantum storage and Cinegy production management delivers cost-effective, highly efficient workflows for key stages of the content creation chain. The reference architectures for playout and archive in this document provide an indication of the primary components required to build a joint solution. For additional information, contact your local Quantum sales representative.

APPENDIX A: FEATURED QUANTUM PRODUCTS

Quantum StorNext technology is ideally suited to provide the storage infrastructure for Cinegy installations. StorNext is a high-performance, shared storage and archiving solution capable of providing file access of more than 15 GB/sec and scaling into multiple petabytes of online disk-based content and hundreds of petabytes of disk- or tape-based archive. The solution supports both SAN and NAS (SMB/NFS) presentation of files, and can simultaneously manage multiple types of storage (Fibre Channel, iSCSI, SAS, and SATA) under a single namespace.

StorNext Storage Manager

StorNext Storage Manager provides automated, policy-based transparent data movement of content between disk tiers and tape storage solutions, as well as capacity management of attached storage devices.

- Allows up to four separate copies of the same file to be created, and up to 50 versions of that file at each storage location
- Allows content to be tiered to active disk-based storage, archive disk, tape, or public or private cloud infrastructures
- Provides a web-based API interface for integration with third-party applications and systems

Xcellis Workflow Director

Xcellis Workflow Director combines the features of StorNext in an HA metadata appliance consisting of two controllers and a metadata storage array. Disk and tape agnostic, Xcellis Workflow Director comes prelicensed to support up to 10 SAN clients (in addition to the two SAN clients for the MDC, which are included).

- Enhanced user interface provides easy installation, advanced reporting/logging, and simplified software/firmware upgrades
- Supports applications as virtual machines using the Quantum Dynamic Application Environment, allowing users to deploy, launch, and operate media management, WAN acceleration, transcoding, and other third-party applications without the need for additional server hardware or networking infrastructure
- Provides multi-protocol LAN access (NAS and DLC) for Ethernet-based clients

Xcellis Workflow Extender

Xcellis Workflow Extender is a multi-purpose appliance with associated StorNext software licensing that can be configured to provide one (or more) of the following functions:

- LAN gateway—Allows connection of StorNext LAN clients (DLC) directly to Xcellis with no need for client-based licensing
- NAS gateway—Allows connection of SMB and NFS clients directly to Xcellis with no need for client-based licensing
- Distributed Data Mover (DDM)—Acts as an additional offload engine to move data from primary storage to a tier—such as the cloud, object, disk, or tape—in StorNext Storage Manager environments

QXS-Series Hybrid Storage

Quantum QXS storage systems deliver real-time, automatic intelligent tiering with flash- or disk-based technology in a single unit. Available in a range of configuration options—including different

controller types, form factors, and drives—QXS appliances are tuned to serve as primary storage in large unstructured data environments, such as those commonly used in media and entertainment.

- **QXS-3:** Entry-level, value-priced storage—raw capacity of 48 to 96 TB per chassis, performance of 3.3 GB/sec sequential reads and 2.4 GB/sec sequential writes
- **QXS-4:** High-performance, ultra-high-density storage—raw capacity of 48 to 448 TB per chassis, performance of 6.4 GB/sec sequential reads and 5.3 GB/sec sequential writes
- **QXS-6:** Extreme, high-performance storage —raw capacity of 96 to 448 TB per chassis; performance of 12 GB/sec sequential reads and 5.7 GB/sec sequential writes

StorNext AEL Archives

StorNext AEL Archives offer high-performance, highly scalable data management solutions that are also cost effective and easy to manage. When added to a StorNext file system deployment, StorNext AEL Archives provide nearline archiving with built-in data protection and self-healing capabilities to ensure that valuable digital assets are protected and accessible over time. The libraries are available as two standard offerings:

- **AEL6:** Scales from 50 to 800 slots
- **AEL6000:** Scales from 400 to more than 12,000 slots

APPENDIX B: FEATURED CINEGY PRODUCTS

Cinegy offers an integrated, end-to-end, UHD, HD, and SD digital media production and management solution that encompasses every aspect of media production, including: real-time media ingest in multiple quality levels; automatic shot detection; speech recognition; advanced logging; production notes; voice annotation; rights management; digital asset management; search and retrieval; sequencing; storyboarding; non-linear editing; workgroup collaboration; remote screening; review and approval; conform; branding and graphics; and playout.

The components and products that encompass the Cinegy product line (Figure 6) include the following:

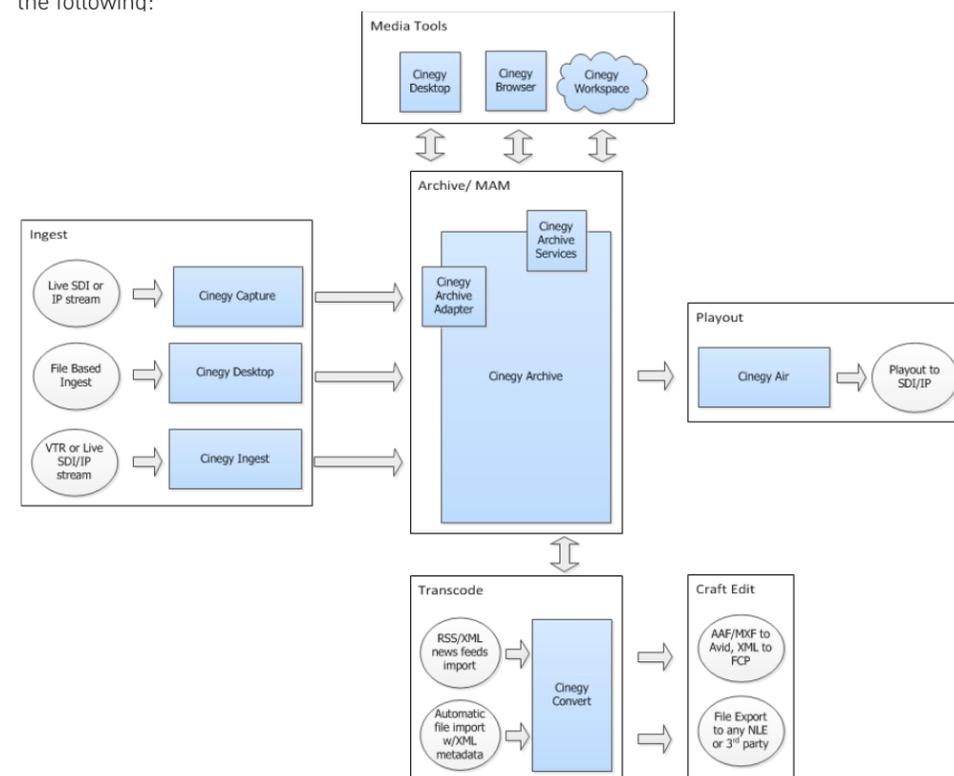


Figure 6. The Cinegy product suite

Cinegy Archive

Cinegy Archive provides the core functionality for any archive solution acting as an HA MAM system based on the Microsoft SQL 2008 SP3 or later database platform. Administered with the Cinegy Enterprise Manager application, the system supports proxy-based workflows and enables local and remote real-time collaboration—allowing users to work on video material in real time within seconds of an ingest starting. Cinegy Archive offers an extensive configurable metadata schema for storing information about each stored asset.

Cinegy Capture Pro

Cinegy Capture Pro provides SDI and IP stream multi-channel ingest capability, allowing ingest to Cinegy Archive systems or general file stores. The system generates multiple copies and versions of an input at the point of capture to support proxy-based workflow and multi-format/multi-site delivery.

Cinegy Convert

Cinegy Convert is a server-based transcoding and batch processing engine for stand-alone operation or integration with Cinegy Archive. It can be used to complete repetitive tasks, such as watch-folder ingests, or for publishing Cinegy Archive-based sequences to an Avid editor for final editing.

Cinegy Workspace

Cinegy Workspace is a rich Internet application that provides real-time access to web-quality proxies of content held within the Cinegy Archive. Users can log, search, view, and select assets in a collaborative environment.

Cinegy Desktop

Cinegy Desktop provides a window on the Cinegy Archive, giving real-time access to all resolutions of content held within the archive. Users can log, search, view, and edit (including timeline edit) stored content in a collaborative environment (an edit changed on one workstation is automatically updated on another user's desktop, assuming users have the appropriate rights). The system provides a user interface for tape- or file-based ingest or import of material such as camera card media, as well as access to the Cinegy Archive via a standard LAN connection (or VPN).

Cinegy Air

Cinegy Air is a software suite featuring a powerful video engine for handling broadcast video in SDI or IP up to 2160p/60, a video server interface, a playout automation interface with playlist editor, SDI to IP conversion (and vice versa), branding editor, CG, proxy caching, and more. The built-in Inventory Browser connects Cinegy Desktop production directly to Air playout, allowing instant transfer from timeline to antenna.

Cinegy Browser

Cinegy Browser allows Avid desktop users to view, select, and transfer material from the Cinegy Archive into their local editing environment.

Cinegy Multiviewer

Cinegy Multiviewer is a highly configurable application that allows users to monitor any service (IP or SDI feed) for content or problems. The system functions as an ideal tool when managing Cinegy products such as Air or Capture, as automatic analysis of pictures and sound is possible, alerting the operator immediately if any channels display unexpected behavior. Cinegy Multiviewer features a fully customizable interface and can include dynamic GUI widgets such as clocks, CPU meters, and so on. Outputs can be rendered directly to a standard screen, or recompressed and streamed back to the standard IP network.

Cinegy Route

Cinegy Route serves as a software-based router for IP infrastructures and enables centralized configuration of sources and destinations.

Cinegy Stream Switcher

Cinegy Stream Switcher provides a failover solution to automatically switch RTP stream sources in redundant system designs. The system consists of a control application for management and monitoring, as well as an analysis service that does the stream switching and associated monitoring of input sources. When delivering IP-based outputs to Cinegy Air, the main and backup RTP streams are taken from two Air engines, and a single redundant output is provided for distribution.

Cinegy Live

Cinegy Live is a software-based vision mixer for IP and SDI sources with the ability to handle SD, HD, and 4K content. It possesses a customizable interface designed for operation via touch screen.



ABOUT QUANTUM

Quantum is a leading expert in scale-out tiered storage, archive, and data protection. The company's StorNext® platform powers modern high-performance workflows, enabling seamless, real-time collaboration and keeping content readily accessible for future use and re-monetization. More than 100,000 customers have trusted Quantum to address their most demanding content workflow needs, including top studios, major broadcasters and cutting-edge content creators. With Quantum, customers have the end-to-end storage platform they need to manage assets from ingest through finishing and into delivery and long-term preservation. See how at www.quantum.com/customerstories-mediaent.

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