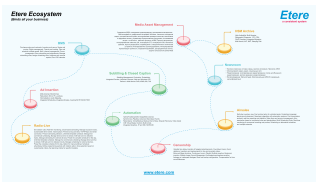
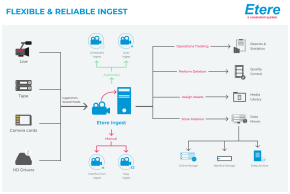
Sky Racing Project: A Centralized Media Management System

Etere provides broadcasters, media companies, content providers and house productions with an integrated media management system which combines powerful servers with an easy to use user interface.

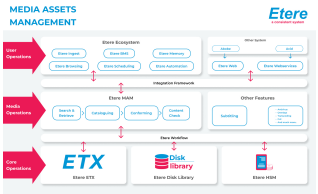
Sky Racing



Etere Ecosystem



Etere Ingest diagram



Media Asset Management diagram

For more information, please refer to the attachment.

Introduction
Sky Racing is a leading Australian horse and greyhound racing television channel that broadcasts more than 60,000 races each year to millions of viewers in Australia and around the globe. Sky Racing started transmitting in September 1998 , as a spin off of Sky Channel. Nowadays Sky Racing Australia has 3 channels, Sky Racing 1, Sky Racing 2 and Sky Racing World, being the latter two launched in the first quarter of 2010.

Sky Racing transmits to more than 5,000 outlets across Australia and in 18 countries around the world via satellite, cable, mobile TV and the Internet. Sky Racing provides up to 17 hours of live thoroughbred, harness and greyhound racing coverage each day. In addition, in-depth form previews and reviews are telecast, as well as racing and sports betting programming. Sky Racing reaches approximately 2.2 million Australian homes with a potential reach of more than 5 million viewers.

Etere provides broadcasters, media companies, content providers and house productions with an integrated media management system which combines powerful servers with an easy to use user interface. Etere is able to closely interact with other systems present within the global solution; it allows searching, browsing, editing and delivering media files stored across the various sub-systems present in the global solution:

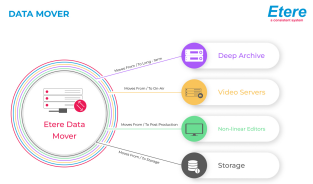
Sky Racing has requested the implementation of a new Broadcast System into its Sydney facilities, the proposed system will be able to integrate together new flexible HD video servers and current SD video servers as well as ensured scalability for future growth.

This paper describes Etere as a total system integrator, a solution that ensures the reliability of the global project, implementing a robust media archive system able to provide instant access to any file, at anytime, from any server, in any format and most important, with the maximum of speed, characteristics that will ensure the improvement of each single broadcasting area with a wide set of cutting edge modules that goes from content acquisition to content delivery.

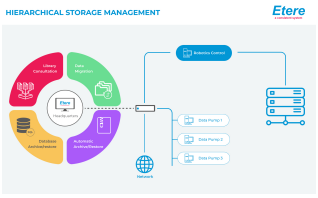
Etere Solution: Overview
Etere's proposed solution aims to implement a Centralized Media Management System able to be the core of the new Sky Racing, the central media management will be based in the distributed architecture of Etere, a key characteristic that will permit not only to tightly integrate the hardware current available in the station but also to support future devices integration. The diagram below illustrates how Etere can take control of the various operations that makes part of the entire Sky Race workflow.

Etere's solution will permit to straightly connect the scheduled captured recordings of Etere Ingest with Etere MAM to view and cut video assets and deliver them to the proper archive via workflow. Thanks to its distributed nature, Etere count with the level of flexibility required for allowing the implementation of a mixed solution that will make of the migration from SD to HD an easier task.

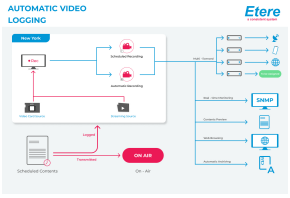
Etere's solution consist of a system intended to be the core of the central archive,



Data mover scheme

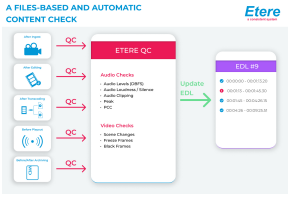


HSM Diagram



Memory diagram

Etere Web Diagram



Etere QC

providing media archive management and delivery services to the global system including instant access and delivery of media files; all this media management is cemented on a file-based workflow framework featuring a wide range of function-specific workflows for ingest, production and playout with additional integration capabilities. The modules that Etere will implement across the system are briefly described below:

■**Etere Ingest**, the flexible and scalable module that will perform a scheduled capturing of twenty channels distributed across five video servers
■**Etere MAM**, the best solution for indexing and editing a huge amount of media assets, it provides tools for an easier metadata insertion and video cut and merge
■**Etere Data Mover**, the enterprise workflow-based media manager that guarantees timing and effectiveness on media transfers between devices
■**Etere HSM**, an automatic tape-based storage system for long-term management archive

An Etere-based central media management system is able to interface existing systems while maintaining the consistence of its wide set of characteristics that makes of it the right solution for an enterprise management of digital content under a file-based workflow environment. The station will be mainly provided with the following key features:

■A patented distributed architecture to avoid any single point of failure
■Transparent media transferring, the correct media format will be always delivered
■Intelligent and customized workflow management
■Seamless integration with existing and co-existing systems
■Best flexibility on capturing SD/HD media content from multiple sources in scheduled basis
■Robust browsing features including preview, slow-motion playback, timecode navigation, scenes bookmarking, quick metadata insertion
■Support of the most common video formats including wrapped MXF containers
■Quality management to ensure the safety of archived assets over short and long terms
■Safe and fully-tracked access to the content archive
■Full integration support for NLE stations, including content uploading/downloading

■Tight integration with Newsroom systems such as ENPS
■Fast and efficient transferring connection between internal –and external-systems

An important aspect of the selected Etere solution is the wide range of functionalities which support the preservation and high-availability of media content archived and catalogued by the Etere system. The implementation of an Etere system will integrate the tape libraries that make part of the DMMS archive of the station, to store and transparently manage the long-term media archiving; moreover NLE systems will be able to access the digital archive directly and efficiently through a proper production environment, making use of the highest security standards.

3. ETERE SOLUTION: ARCHITECTURE

Etere is based on a distributed architecture which allows different modules to run on different workstations interconnected via a local area network. All system configuration parameters, security roles, user data, and pre-defined rules are stored in a reliable SQL database supporting backup and redundancy operations.

3.1 A Distributed System

ETERE is a distributed, modular and fully integrated broadcasting system composed by a set of applications specifically oriented to efficiently perform each complex phase of the broadcasting chain synchronously within the same database environment, being all managed by suitable user-defined workflows that ensure an efficient overall system controlling.

Etere's distributed architecture allows achieving a top-level availability of resources and reliability of operations across the entire broadcast workflow thanks to its

redundant capabilities to improve the fault resilience on any hardware or software failure.

3.2 Multi-level File Access Hierarchy
Etere offers a hierarchical storage management by organizing in user-specific access levels an unlimited number of content versions offering 'instant access' (from video servers), 5 minutes access (from NLE) and 15 min access (from archives), being all these levels available to the operator under a simple and user-friendly interface:

Tape Library Management
Etere allows stations to carry out the management of tapes (i.e.: video tapes, data tapes, discs, etc) by providing them with a set of modules specifically designed to improve the most important tasks involved in the logical management of tapes:

Etere provides full support for managing tape libraries within the system, being possible to monitor its status and view specific contents in real-time:

4. ETERE SOLUTION: MEDIA FUNCTIONALITIES
Etere's solution features an integrated and professional approach based on a workflow management to optimize the station's entire broadcasting system, reduce operating costs and facilitate overall process control. Etere Workflow permits modules to for example, seek confirmation for sensitive process, follow specific rules, enhance the efficiency and reliability of process, and manage multiple workflows to perform different tasks simultaneously and independently.

4.1 Multiple Storage Management
Etere reduce the complexity of managing storage devices by arranging physical storage devices present across the system into metadevices (logical devices), the use of metadevices improve the overall media management by offering the following features:
■ Automated management via workflow of logical devices including arching, restoring, transcoding, etc,
■ Monitored storage space owing to the set of restrictions,
■ Increased storage and better performance since metadevices acts as a virtual device representing several logical disks or disk systems:
■ Distributed storage according to specific requirements without the need of creating partitions, just associate individual disk volumes to different:

4.2 Custom Design Workflow
All workflows can be customized to fit the real needs of the station and thus give complete control
over the overall system management which offers:
■ Clear definition of each complex step of the broadcasting process,
■ Visual representation of each step mapped out on a PC not in a paper document,
■ Set of instructions and authorizations that must be followed in order to move forward,
■ Complete log of all steps carried out, operations denied etc.

A comprehensive and user-friendly workspace allows creating suitable workflows based on custom actions just by dragging and dropping the necessary elements into it:

4.3 Integration between workflows
Etere allows calling workflows from others just by inserting an action that can perform a specific task (i.e.: attach, attach and start, start, abort, reset, restart, detach, etc) on a certain workflow:

4.4 Video Files Quality check Workflow
An Etere quality check workflow is able to automatically ask operators to assign a quality value to a certain asset(s) after browsing its video content:

4.5 Video Files Content Check via Workflow

Etere counts with a workflow action called content check, that once inserted into a workflow and attached to an asset, searches on its related proxy video file for defective video issues to subsequently mark (into their EDL list) all encountered defective segments including black scenes, scene changes and freeze video:

4.6 Video Files Archiving Workflow
Etere allows you to design a workflow for archiving your assets on LTO tapes, including a quality and content check, a proxy copy generation and a final email indicating the result of the process:

4.7 Video Files Restore Workflow
Create a workflow to automatically restore any scheduled asset for its playout by searching for them amongst a group of devices arranged on basis of their priority:

4.8 Video Files Transcoding
Etere's integration with Rhozet's Carbon Coder software handles a wide array of critical operations including format conversions, workflow operations that can be launched for example, immediately after a content capture:

4.9 Video Files Checksum MD5 Verification
Etere offers an enterprise control of video files integrity; it keeps a log of the hash md5 of video files such in a way that it is possible to verify at any time if they have been modified after their approval. All video files registered on the Etere's database can be verified through an md5 checksum, this control is performed via workflow, each time that a video file is moved from one device to another, its initial hash md5 is calculated to allow a future checking:

The workflow editor allows creating custom Checksum workflows to either generate or check the MD5 hash of a video file.

4.10 Video Files Cut Actions
Etere offers 'Cut actions' that permits to take only a portion of a certain video file, using a given timecode SOM and EOM. Defining and using a Memory Cut operation is as easy as shown below:

5. ETERE SOLUTION: COMPONENTS
ETERE is an integrated broadcasting solution that implements a modular system formed by a set of modules specifically oriented to cover each complex phase of a broadcasting system, focusing to efficiently carry out specific operations such as media ingest, archiving, transferring, browsing, etc. All these operations are synchronously performed within the same database environment and managed by suitable user-defined workflows that ensure an efficient overall system control; these are some of the main features that make of ETERE a solution that can easily fit any media management workflow.

All modules that make part of the Etere's proposed solution will be treated throughout this chapter, explaining how its distributed architecture and integrated complementation are key parts of the success of the global system where a top-level performance and reliability is reached.

5.1 ETERE INGEST: An Enterprise Capturing System
Five ingest channels will be implemented for the Auto Ingest Server, they will be managed by Etere Ingest, a versatile set of modular applications that significantly improves the digitization process inside a broadcasting system, this software covers any particular requirement of the entire process such as automatic and scheduled ingest:

5.2 Etere MAM: Browsing and Editing
Etere enables comprehensive search and browse and cataloguing of rich media, its very intuitive interface establishes a bridge between the ingest department and the production department, allowing contents to be browsed simultaneously from various workstations thus enabling low-res proxy browsing over the network.

Etere also allows restoring only a part of video files by creating either high or low

resolution video files including specific segments described on the source video EDL, it is important to note that as usual on Etere's operations, the conforming of video files is fully performed via workflow:

Etere MAM permits to join cut segments from different sources, to create a single final video file containing all scenes selected by the operator, use this function to for example perform the dubbing of video contents:

The image above illustrates the user-friendly interface on which operators creates new video sequences of MAM captions which includes all relevant metadata associated to the inserted scenes.

5.3 ETERE MEDIA MANAGER: A Digital Archiving and Delivery

The Media Management solution proposed to encompass station's content transfer and archiving goes beyond of a simple copy concept by moving video files based on custom policies, transcoding video files when required and offering a full track of all operations.

Video contents will be transferred between the various departments (e.g.: near-line storage, archive, post-production, playout, browsing, and even non-Etere systems) by Etere Media Manager; this migration process also includes rewrapping and transcoding capabilities. Etere's approach is oriented to "virtualize" the entire media management process, improving it with flexibility, customization and most important cost-effectiveness.

Etere manages (logical) metadevices instead of (physical) devices, this approach results in a wide range of possibilities for the media management, for example, it is possible to control with one click the available space of all metadevices:

Etere Data Mover is the application used to perform the physical storage and retrieval of video files, a typical Data Mover operation would be to move a video clip from a video server to an archive based on custom actions which are defined and executed via workflow.

Additionally, the crucial logging function is available for all Etere applications, log files are written by the software each time it performs a task so it will be possible to trace their execution status, interaction level, and final result.

5.4 ETERE HSM: A Tape Based Archiving

The Quantum tape libraries present in the station will be managed by Etere HSM, the cost-effective solution to radically streamline the management of expensive tape libraries; allowing stations to optimize the migration of contents including high and low versions as well as associated metadata.

Etere HSM improves the management of libraries by controlling their mechanical movements through the HSM Robotics Control and HSM Data Pump applications, which are able to run several data pumps on different machines to boost their throughput, while offering access to real-time logs, reports and statistics.

Etere HSM distinguish four different archiving levels into a broadcasting workflow, these levels required distinct access times which vary from 0 minutes (video server) to 15 minutes (standard video tapes).

All these levels are managed "virtually", that is, you can use logical devices (metadevices) based on physical devices to free design your storage layout, enriching in this way the entire system with the benefits derived from the use of metadevices:

- Carry out loan-balanced movements on an intelligent multi-volume scenario,
- Extend your storage space by joining physical devices into one metadevice, without altering the archiving workflow,
- Categorize your storage devices by dividing them into metadevices with no partitioning required,
- Space limits and storage distribution are defined by the user and not by devices itself,

■ Classify metadevices in media pools in order to automate their management,
■ Background defragmentation and online/offline tape management,
■ Scheduled archiving of devices, media contents and entire databases.

Etere HSM forms a tandem with Etere Data Mover to be the only solution in the market with an embedded multi-level and multi-rule cache that offers an intelligent management which ensures the best performances with low investments. Owing to Etere's comprehensive character, these applications are perfectly integrated with other modules (e.g.: Ingest, EtereWeb, etc) to allow all these modules to use shared resources and have unlimited communication.

5.5 ETEREWEB: Post-Production Integration
Etere Web is the web service seamlessly integrated with the playout and media management system to permit arriving contents to be managed digitally, resulting into a faster and more efficient delivery process which also includes digital signing features for any delivered content.

EtereWeb integrates the latest streaming technologies for video distribution and a comprehensive rights management system that gives to authorized users the possibility to access via web to a user-friendly interface:

Etere Web works perfectly behind routers so remote access and ftp transfers are drastically improved. NLE systems can deliver contents via Etere Web as a digital equivalent of physical reception, where selected people can deliver video and metadata to the station, but owing to its digital nature, operations are perfectly organized, performed and logged, avoiding loss of any content information.

5.6 ETERE MEMORY: Automatic Video Logging
Etere Memory is the module that automatically captures an audio/video copy of all specified broadcasted events. The interface is user friendly and provides information about the current recorded file size and the remaining free hard disk space. It is a video logging system, automatic and easy to use, effective in reducing expensive tape:

The recording interface can be either manually or automatically started and it will display a preview of the currently recording event, detailing some important recording information such as status duration, storage path, occupied memory, cache status, etc:

Etere Memory counts with a browsing interface with powerful capabilities to turn a selected video into a sub-clip, inserting the Time-code and sending the video or part of it to standard Microsoft OS users:

Etere Memory allows recording and viewing clips at the same time with just a few frames of delay while offering the following key features:
■ Audience integration: if Etere Memory is used to record competitors' transmissions, you can have a chart audience wizard related to the recorded video in order to understand better your competitors' audience composition,
■ Media Manager integration: is meant for both local or network video clip storage in order to prevent system faults and to avoid data loss. The integration provides full file maintenance with storage and periodical deletion,
■ SNMP alarms, Etere Memory detects loss of video, black video, or frozen video and alerts using SNMP messages. These alarms can be converted by Etere SNMP console in acoustic, email or Sms,
■ Streaming capabilities. Using Etere Memory you can view the video on the network. This feature is very important if you wish to distribute the video and you don't have a video cabling infrastructure.

5.7 ETERE MOS GATEWAY: Newsroom Integration
Etere MOS is the perfect interface between Etere and Newsrooms; it connects to the Newsroom Computer Systems through the MOS protocol. It will provide TPI with a robust set of features based on key characteristics such as fault tolerance and user-friendly:
■ Simple browsing integration to record and view high and low resolution

synchronized events. Journalists can readily make their own EDL straight from their PCs,
■ Media Asset Management (MAM) provides metadata indexing which lets you retrieve a video or any part of it from the database,
■ A Metadata module analyses video and automatically makes metadata entries based on scene changes, black images, no-sounds parts, subtitles, and MXF metadata. Metadata can be edited for any part of the video,
■ ActiveX MOS integration allows to preview low quality video directly from the News interface,
■ Direct feedback status for events that are cued, ready, playing or missing.

6. Conclusion

This paper has described how the development and deployment of a comprehensive Etere-based “Centralized Media Management System” is able to provide the station with a large number of operational benefits and advantages derived from the efficient use of ultimate media management technology; Etere will manage the digital contents of the station, from acquisition to archiving, while tightly integrating other non-Etere systems thanks to the use of federated capabilities that will allow the integration of web services. The many key benefits that Etere will provide to the station have been condensed in the following points:
■ Reliability, workflow-based operations from ingest to delivery that permits to monitor the individual system functioning while increasing productivity,
■ Integration, a global distributed system with the power of a single system that combines Etere’s core functions with the capabilities of other existing systems,
■ Scalability, for increasing the number of capturing channels and devices without altering the system workflow complexity, thus minimizing operational overheads and reducing overall costs,
■ Efficiency, during the whole media management process, reducing the risk of mistakes when retrieving data since all archived contents are continuously and accurately checked.
■ Flexibility, on implementing the capturing channels from which media content will be acquired,
■ Editing capabilities, the newsroom department of the station will be able to easily browse and edit (cut, merge, restore, etc) video files under a user-friendly interface.