PROJECT

Etere
a consistent system

ETERE:

A Media Archiving, Management and Playout solution

**July 2012**

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1. INTRODUCTION

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

Etere has developed the latest technology to turn a broadcast system into a digital archive that combines rock-solid reliability and high availability with increased bandwidth and storage, allowing operators to easily search, retrieve and browse any media they want from the digital archive.
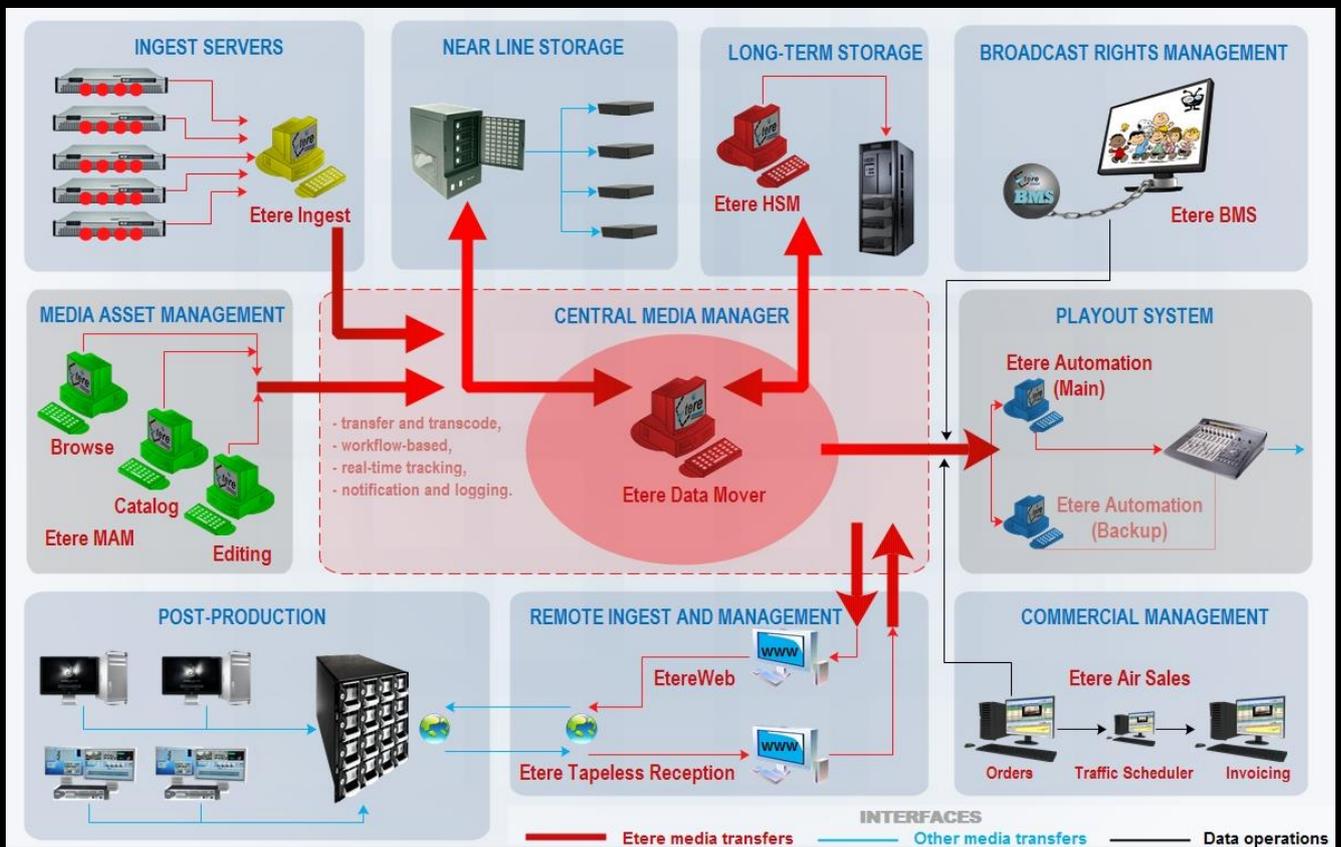
This paper illustrates how Etere is aware about the importance of media archiving, and how it offers not only a world-acknowledged system but a hard-earned expertise on the implementation and maintenance of digital archives able to bring access to any file, at anytime and most important, with a the maximum of speed, characteristics that will ensure the improvement of each single broadcasting area with a wide set of cutting edge applications that goes from an accurate contents management to an automatic delivery of contents.

2. PROJECT OVERVIEW

Etere will implement a "Total Media Management" solution able to store and transparently manage the facilities' archive material over the long term in a tape robotic system; Etere will be a total system integrator that ensures the reliability of the global project.

Etere's solution consist of a system intended to be the core of the central archive, 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 solution for capturing contents from a wide range of sources,

- **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 Automation**, a fault-tolerant system to automate the playout of scheduled contents,

- **Etere HSM**, an automatic tape-based storage system for long-term management archive,

- **Etere Media Manager**, the enterprise workflow-based media manager that guarantees timing and effectiveness on media transfers between devices,

- **Etere Air Sales**, a robust solution for Traffic departments which permits to maximize the productivity of the commercial on-air planning, from an initial proposal to a final invoice.

- **Etere Scheduling**, the module for the draw up of on-air schedules which integrates a wide range of utilities (e.g. import/export, reporting, statistics, etc),

- **Etere BMS**, for a reliable management of broadcast rights, guaranteeing that licensing terms and regulatory conditions regarding purchased programs are not violated,

- **EtereWeb**, a secure and robust threshold to the station's outside world, a web-based interface that will permit a tight integration with –remote- facilities (e.g. post-production).

An Etere-based digital archive system is able to interface existing sub-systems and encompass future expansions while maintaining the consistent 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,

- Reliable control at high-performances of the equipment integrated within the global system,

- Enterprise management and transport of media between storage devices,

- Best flexibility on digitizing media content from multiple sources,

- Robust media management including high resolution files, browse copies and metadata,

- Seamless integration with existing and co-existing systems,

- Quality management to ensure the safety of archived assets over short and long terms,

- Intelligent and customized workflow management,

- Safe and fully-tracked access to the content archive,

- Transparent media transferring, the correct media format will be always delivered,

- Capability of NLE stations for uploading/downloading contents,

- Fast and efficient transferring connection between internal –and external- systems.

An important aspect of the selected Etere solution are the functionalities which support the preservation and high-availability of media content archived and catalogued by the Etere system.

Furthermore, the implementation of an Etere system will allow Editing Systems to access the digital archive directly and efficiently through a proper production environment, making use of the highest security standards.

3. ETERE 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:
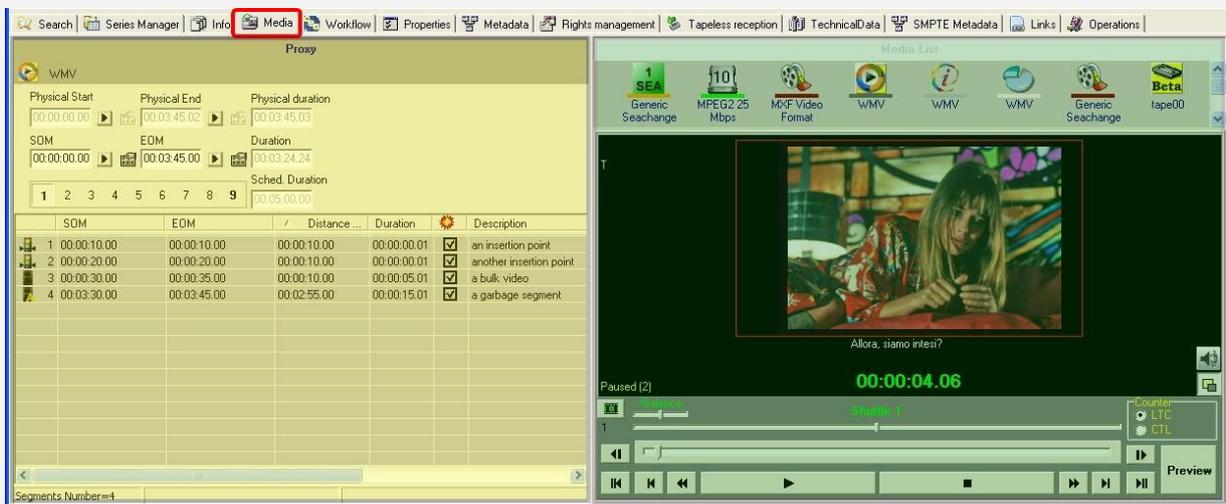
3.3 Tape Library Management

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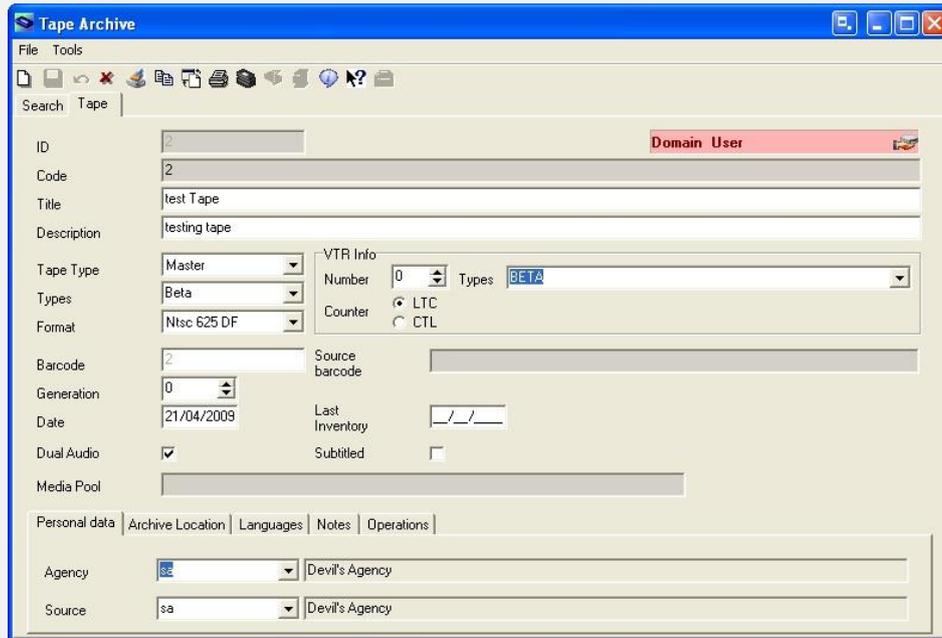
Etere provides full support for managing tape libraries within the system, being possible to monitor its status and view specific contents in real-time:
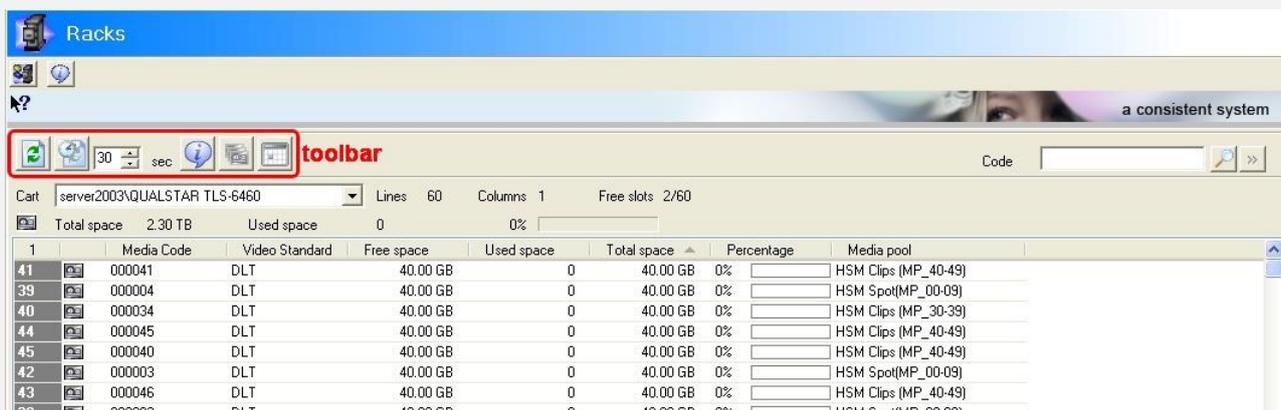
4. WORKFLOW BASED MEDIA MANAGEMENT

Etere's solution features an integrated and professional 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:
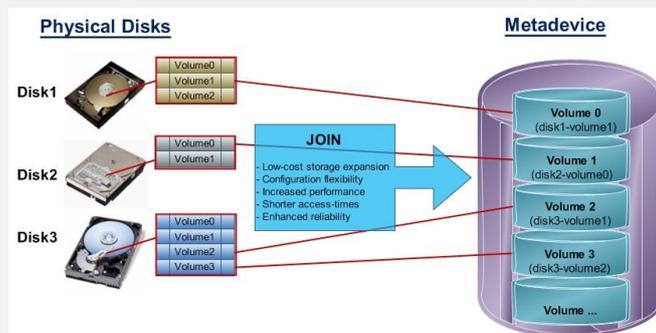
- Distributed storage according to specific requirements without the need of creating partitions, just associate individual disk volumes to different:
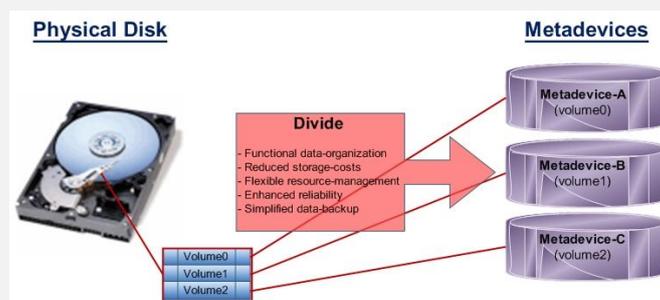
4.2 Custom Design Workflow

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:
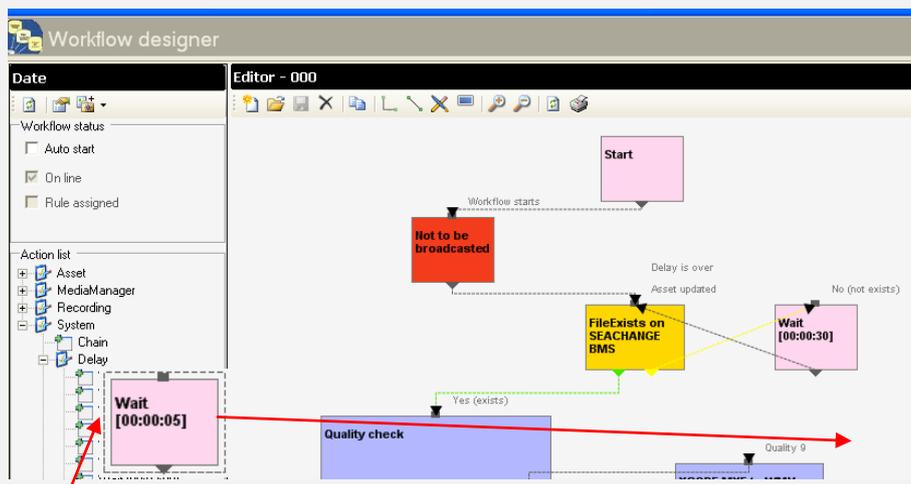
4.3 Video Files Quality check Workflow

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:
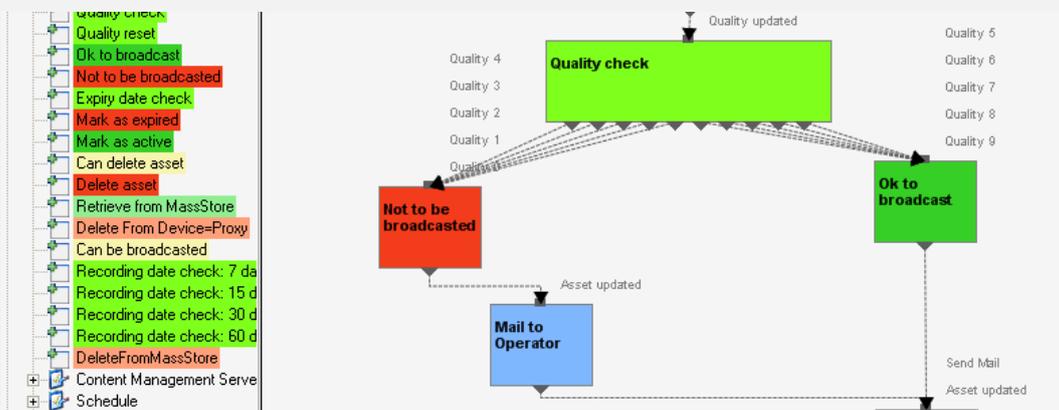
4.4 Video Files Content Check via Workflow

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:
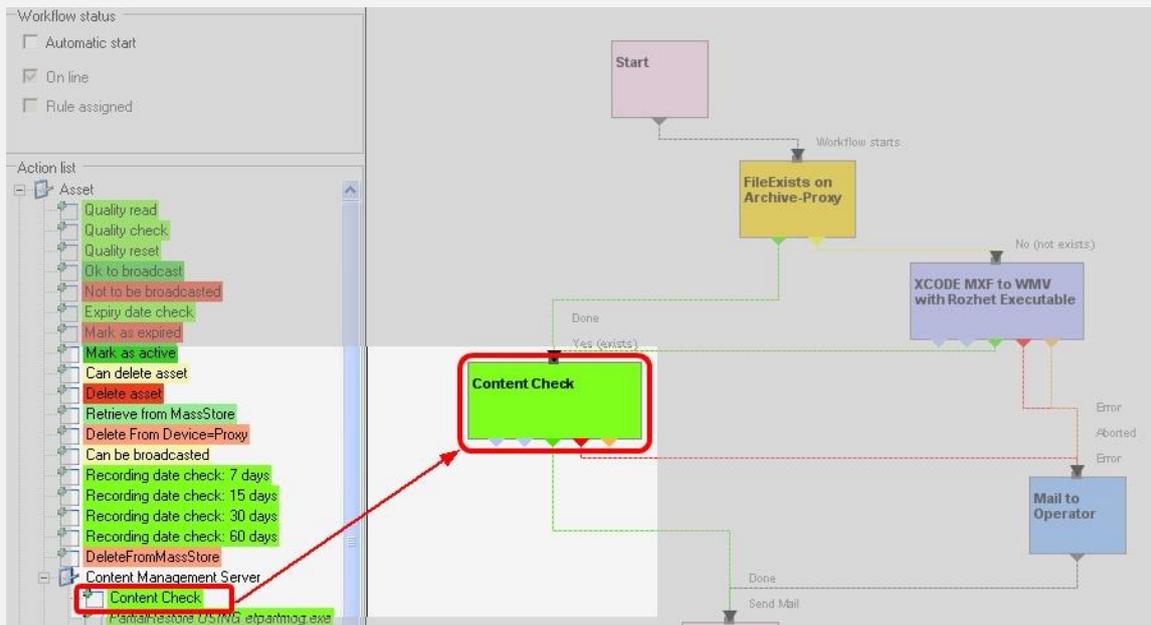

4.5 Video Files Archiving Workflow

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:
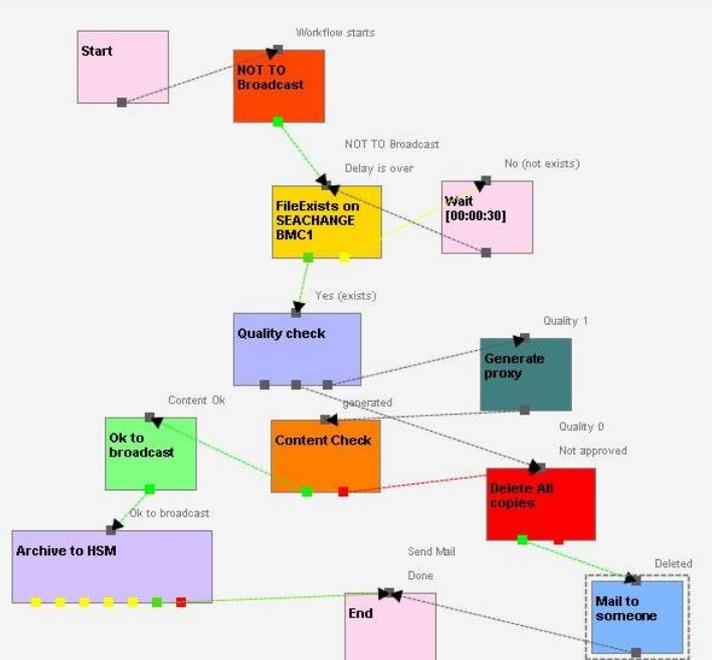
4.6 Video Files Restore Workflow

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:
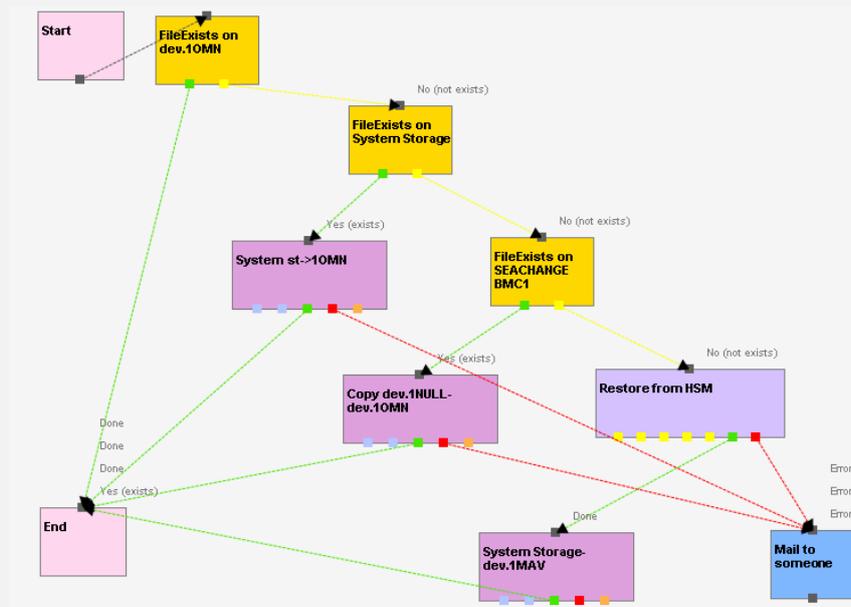
4.7 Video Files Transcoding and Uploading Workflow

In case you need to make your assets available for a web-server, just create a workflow that will automatically retrieve them from the archive, transcoding them automatically to a more suitable codec (e.g.: low-res mpeg1, wm9, QuickTime, mpeg4, etc) and upload it to a web server:
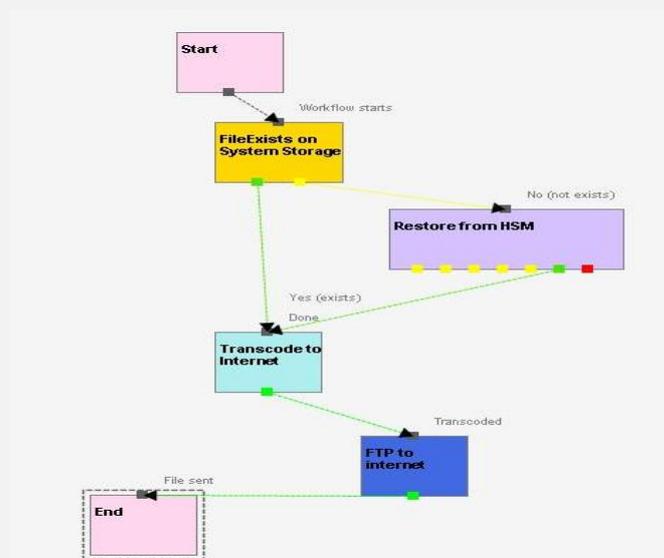
4.8 Video Files Checksum MD5 Verification

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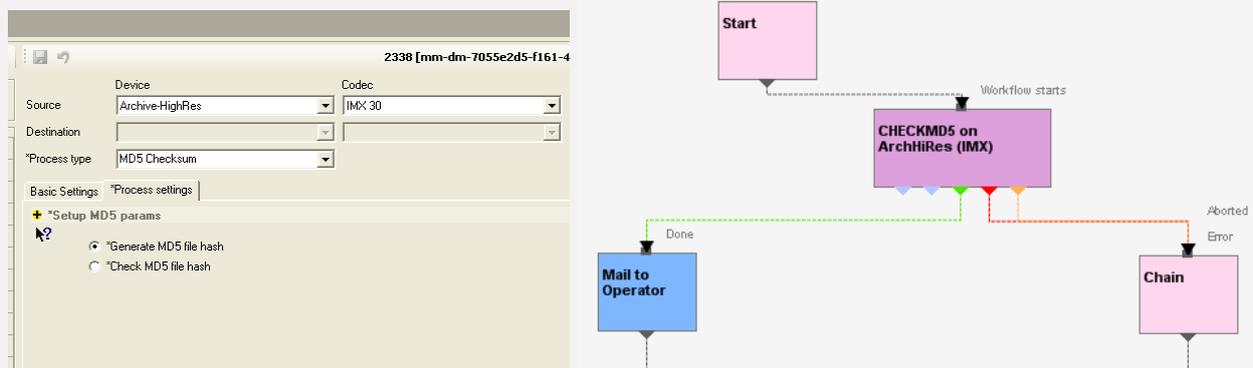
The workflow editor allows creating custom Checksum workflows to either generate or check the MD5 hash of a video file.

5. DETAILED FUNCTIONALITIES

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

Etere Ingest is 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:
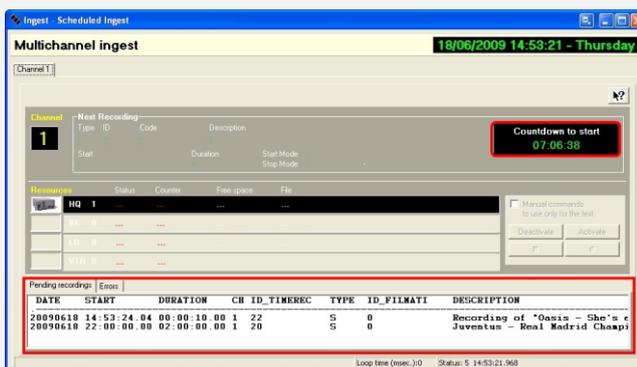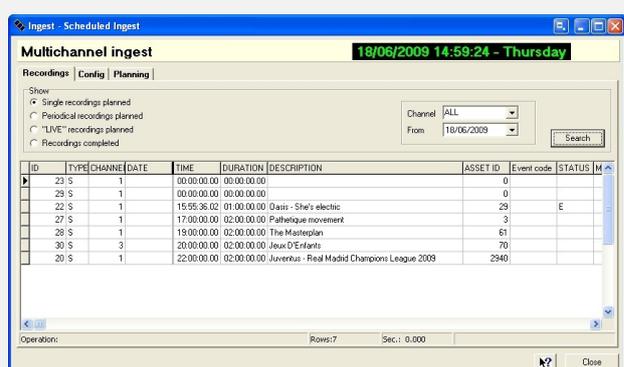
Automatic ingest   *Schedule ingest*

Etere Ingest supports multiple parallel ingest streams, managed automatically either on a single workstation or across various workstations, allowing also to schedule the video files to be ingested:

Planning View

Etere ingest allows recording satellite signals to any storage target including video tapes, video servers, etc, just by configuring GPI devices to trigger the ingest process.

Etere Ingest permits to capture contents from a wide range of video storage devices including the broadcast industry standard Sony XDCAM. Etere counts with a XDCAM-dedicated module to acquire contents from professional XDCAM discs either manually or automatically, via SDI or FTP:
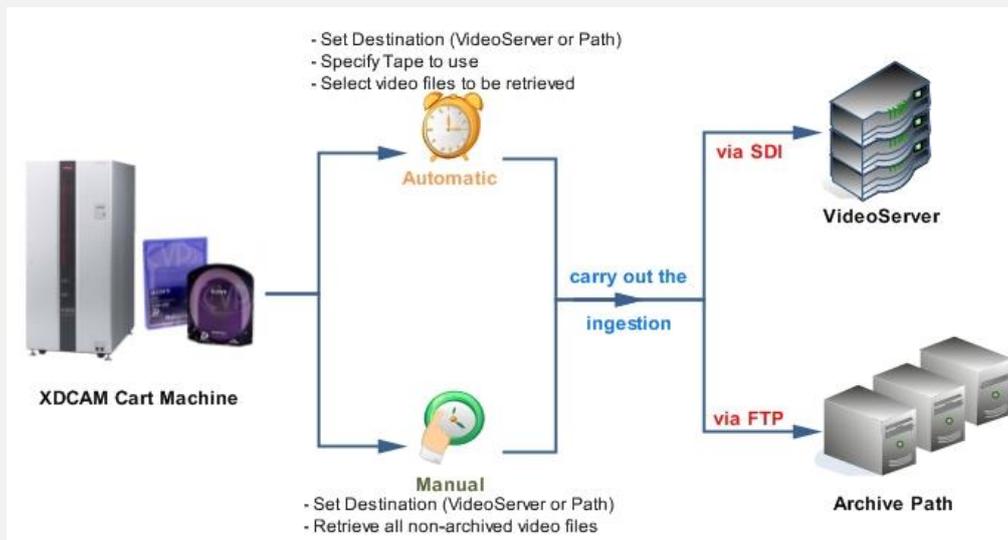
Once ingested, video files are transcoded into the specific format of the destination device on which they will be stored, in the same way; video files are transcoded each time they are moved from one device to another.

The image below illustrates how Etere allows setting the workflow to be launched at the start and end of an ingest process to for example, **create a low resolution** version or **normalize the audio** of captured contents:
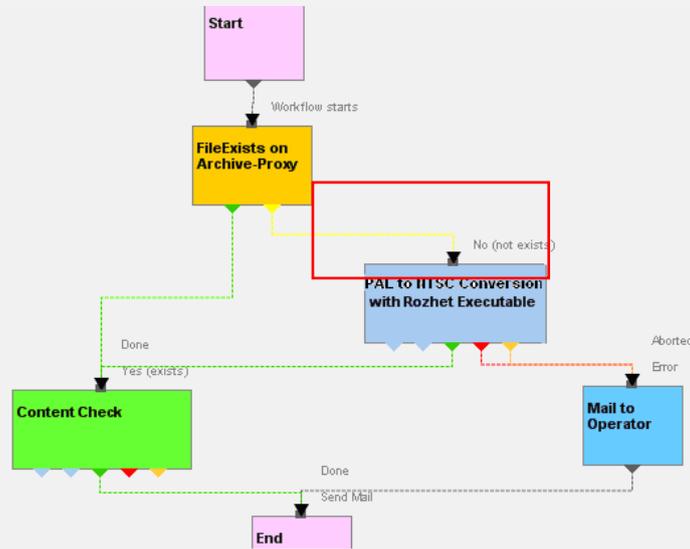
5.2 ETERE MEDIA MANAGER: A Digital Archiving and Delivery

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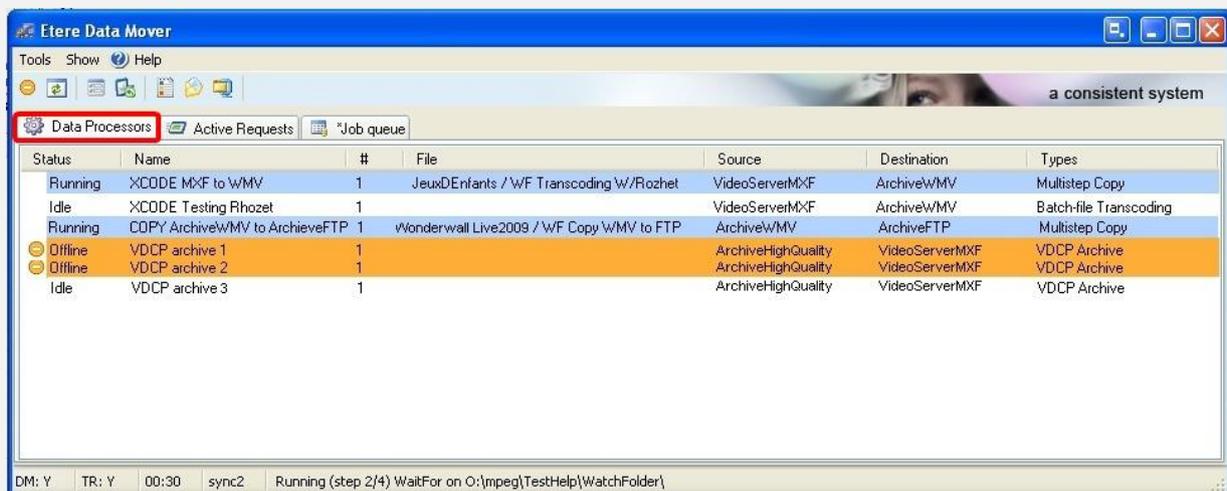
Etere manages (logical) metadevices instead of (physical) devices, this approach results in a wide range of possibilities for the media management, for example, it is possible to control with one click the available space of all metadevices:

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.

5.3 ETERE HSM: A Tape Based Archiving

Etere HSM is 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.

5.4 ETERE TAPELESS RECEPTION: External Integration

Etere Tapeless Reception is a custom web service designed with the purpose of offering an efficient solution for multimedia content transfer between external agencies and stations.

Etere Tapeless Reception takes full advantage of a tapeless environment to eliminate the need of creating physical copies, entrusting valuable material to private couriers, risking of excessive waiting times, etc, thus by enabling contents to be sent digitally (i.e. without using magnetic tapes) via internet, bringing a shorter delivery time than this required by a common consignment of magnetic tapes.
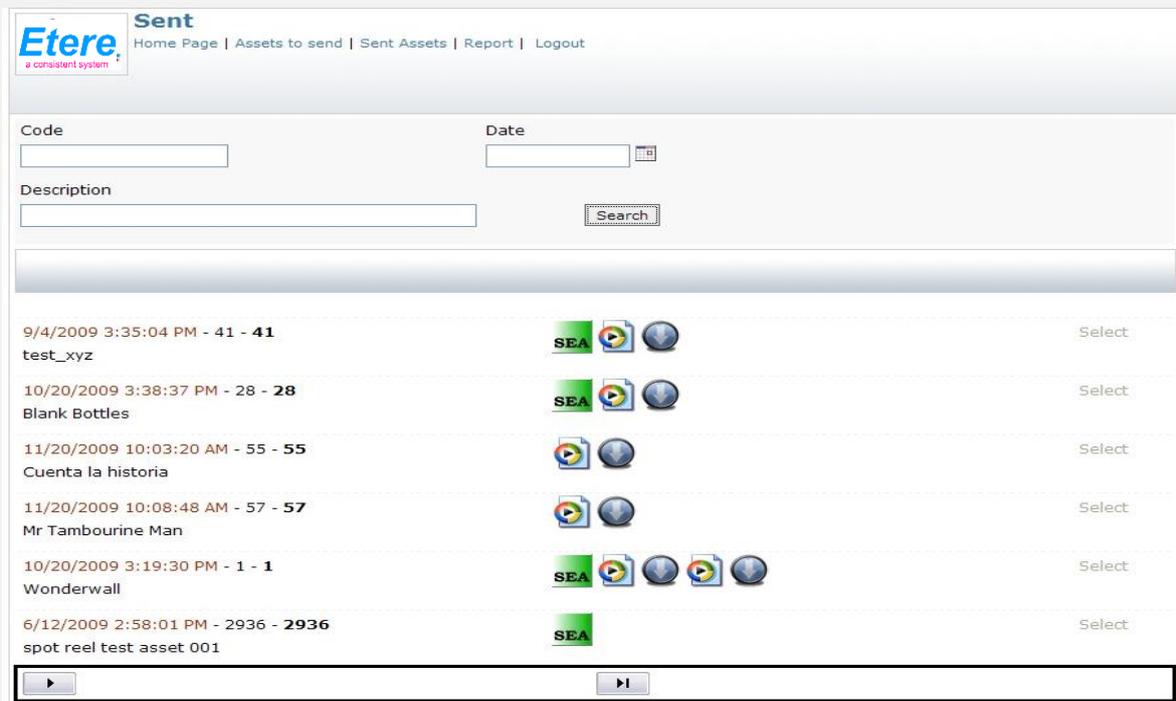
Etere's tapeless approach contributes to increase the level of security of the overall system since file-based operations can be performed only by authorized users, being their access completely tracked by the system.

5.5 ETERE AIR SALES: Commercial Management

Etere Air Sales is a complete, modular and scalable traffic system for the management of the planning and commercial processes of a broadcaster. From planning to playout, it provides specialist application modules to manage sales, planning, presentation, scheduling and invoicing of commercial contents.

Weekly Schedule is the module that permits to build long-term and frame-accurate schedule grids that will define the traffic playlist, this schedule grid is formed by program blocks which at their time are formed by program segments defined by specific properties (i.e.: time range, duration, program type, price list, etc):
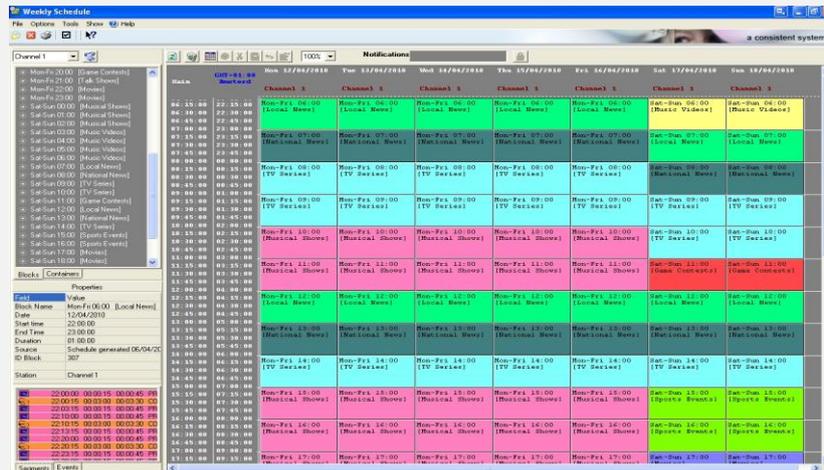
The Strategic Editor module provides a high flexibility to the scheduling process, based on a schedule grid structure; it integrates schedules with the assets' database, ensuring a rock-solid scheduling module where only valid events can be scheduled. Moreover, Strategic Editor features various facilities such as multiple color displays, intuitive events selection, automatic rights verification, etc.

Moreover, the Sales module allows elaborating proposals that includes multiple product details which can be made up by multiple assets (e.g.: for different channels or periods). A customer-tailored elaboration of Sales proposals is possible thanks to the use of flexible schedule grids improved with key booking features such as an automatic pricing based on dayparts (e.g.: breakfast, lunch, dinner and late-night) and a powerful spot placement based on key scheduling criteria (i.e.: top, bottom, priority, rotation or optimization).
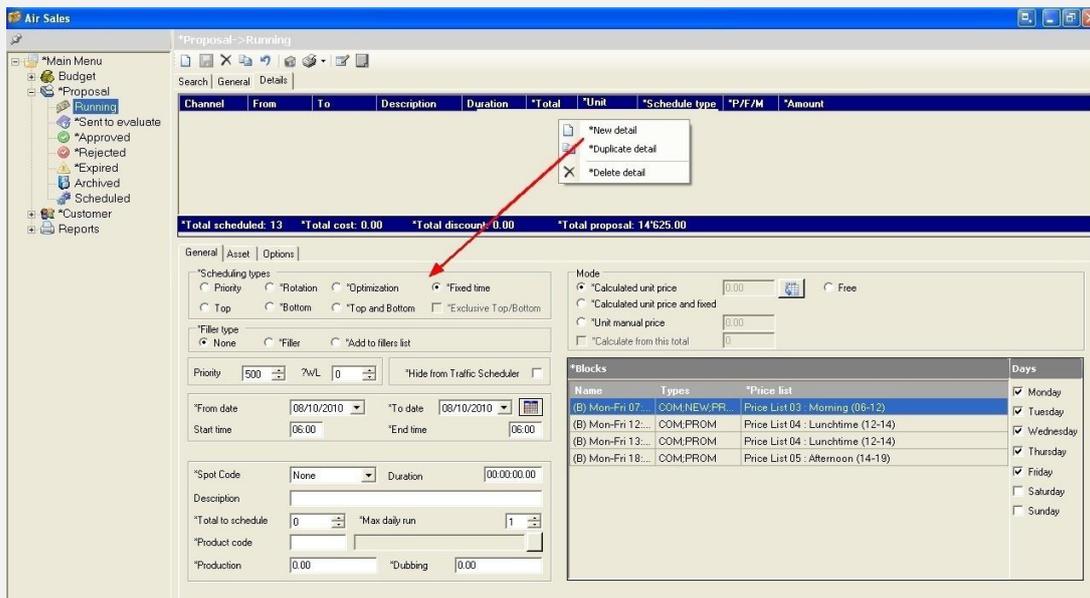
The invoicing process is the final -and most delicate- stage in the commercial broadcast chain, where all commercial events are reconciled with the accounting department, at this stage, the Invoicing module, is the section dedicated to generate, settle and track invoices, it is tightly integrated with all Etere modules to permit a centralized management of invoices including a set of tools that permits operators to easily bill invoices and pay salesmen commissions in just few steps:

5.6 ETERE SCHEDULING: Playlist Management

Etere Scheduling takes care of one of the most delicate process of the broadcast chain, it offers a fully integrated management of daily schedules, and this application is greatly composed by various simple applications that those who draw up the daily schedule will appreciate:

Etere Scheduling also provides operators with a simple graphical module to view, analyze and approve changes (i.e.: traffic, imported, and corrected programs) between the current schedules and any imported schedule. When the current schedule has incoming changes, the operator is advised through a prompt-message which announces that new changes to be approved are available:

This simple interface allows the operator to easily identify the source from which changes have arrived and then decide to either approve or reject them though a simple selection process.

5.7 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:
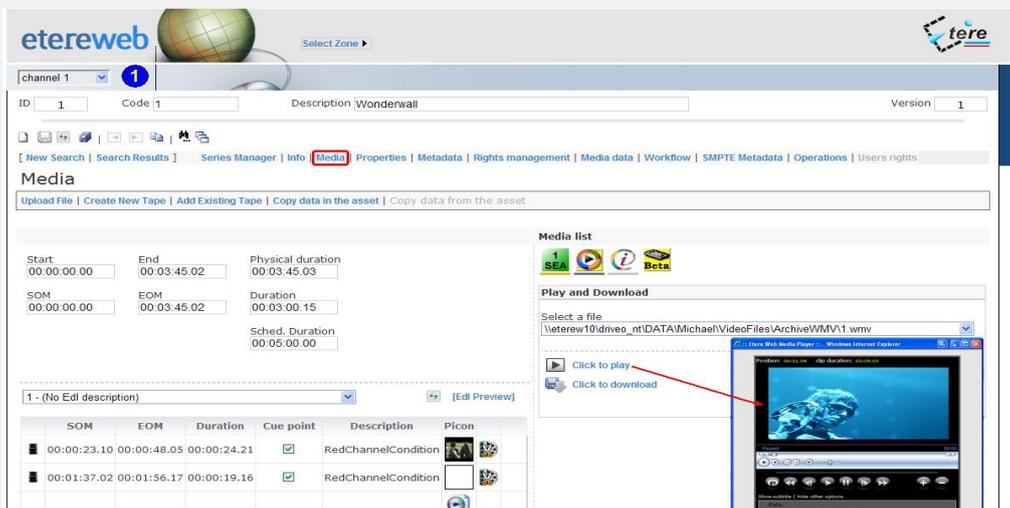
NLE systems can deliver contents via EtereWeb as a digital equivalent of physical reception, where selected people can deliver video and metadata to the station, but owing to its digital nature, operations are perfectly organized, performed and logged, avoiding loss of any content information. Moreover, Etere Web works perfectly behind a DMZ router so remote access and ftp transfers are drastically improved.

5.8 ETERE AUTOMATION: Playout System

Etere Automation is the powerful, reliable and modular playout system able to enhance the station's potential in terms of functions and workflow design, it is based on a unique approach which combines in a single product real-time device control and media asset management, offering a powerful mix of solutions and capabilities under a graphical user-friendly interface displaying for each event its source, type, description, properties, live status, secondary events, time code, GPI status, scheduled and real times, etc:
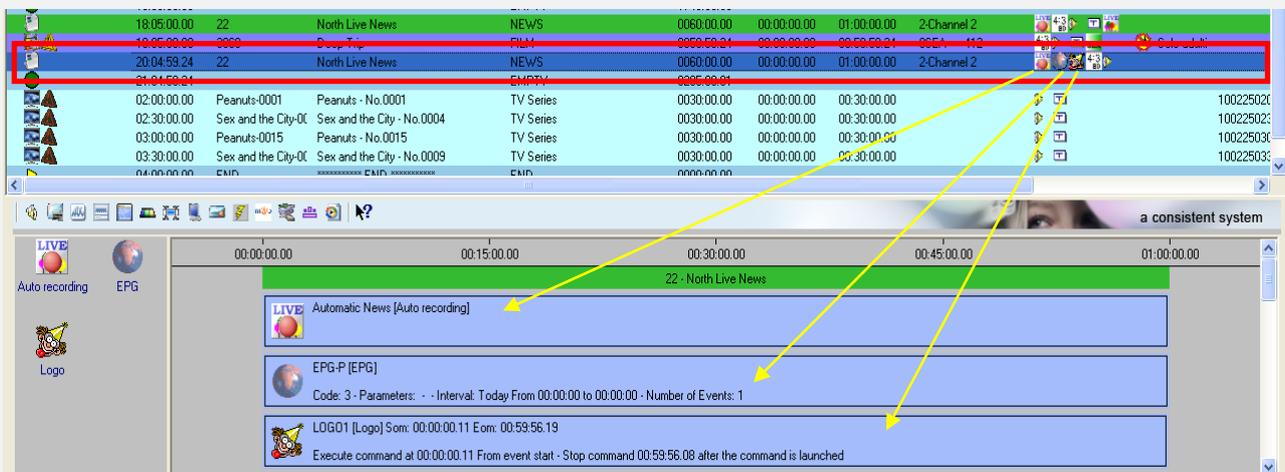
5.7.1 Secondary Events Management

Etere Automation manages all the secondary events intended to be transmitted by dedicated devices (e.g.: Logo Generators, Crawl Generators, Subtitlers, etc) with a simple graphical tool, allowing previewing secondary events in low res before their playout through a browsing application:
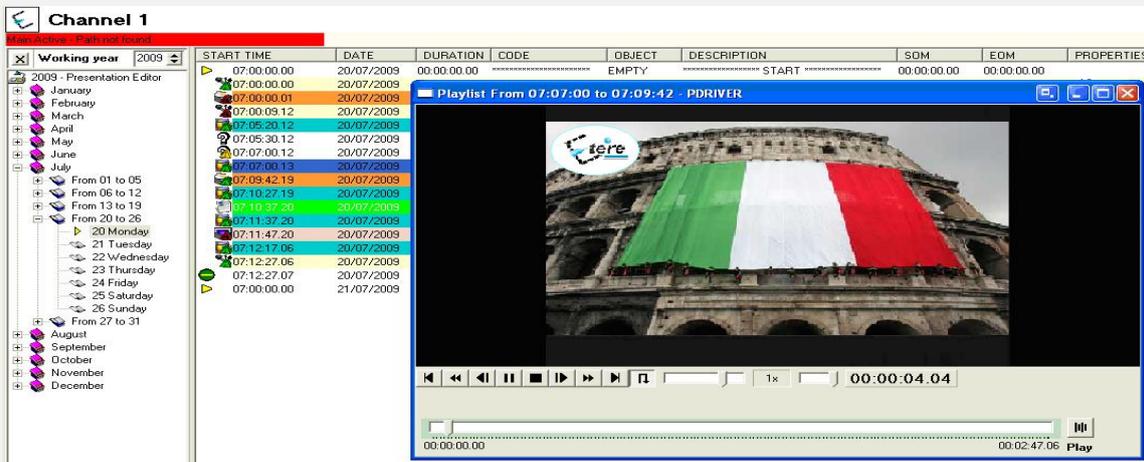
5.7.2 Live Events Management

Etere Automation offers complete support for live events present on the daily schedule, being possible to manage various different live inputs that can be switched at any time, few minutes before the event broadcasting or even during its transmission:

Additionally, Etere allows managing one video router per automation, being possible to create links between routers so when a channel is switched in the Main Router; the equivalent channel is also switched in the Backup Router:
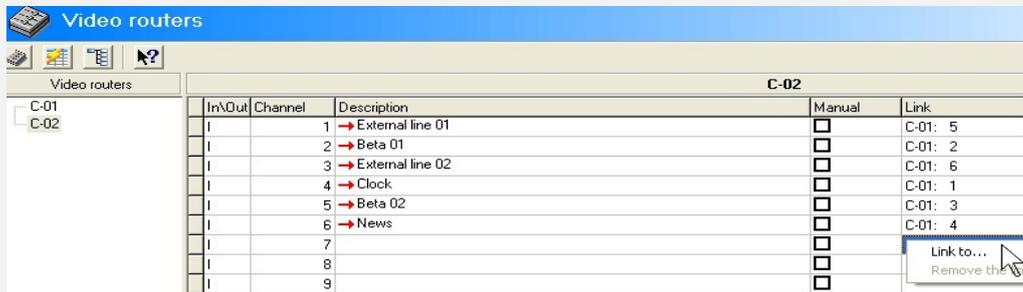
5.7.3 As-Run Logging

Moreover, the ability to export As-Run logs containing the schedule "actually" transmitted allows an easy reconciliation between planned and real playout, being possible to send to multiple (UNC and FTP) destinations a frame-accurate log in any of the available formats:

```
[-  ] 04/28 15:09:20.593 |            |Log Started
[ APP    ] [2010-04-28 15:09:20.21 AUTOMATION RESET
[ APP    ] [2010-04-28 15:10:31.05 AUTOMATION IS ONAIR
[ CLIP   ] [2010-04-28 15:10:30.17 Y, 210136785149, 22  , 0LIVE00000     , Live News , F, 00:00:00.00, 00:59:59.24, 01:00:00.00
[ CLIP   ] [2010-04-28 16:10:01.19 Y, 210135546001, 28  , 0MCL  CBBot   , B-Bottles , F, 00:00:00.00, 00:00:08.18, 00:00:08.19
[ CLIP   ] [2010-04-28 16:17:03.21 Y, 210136107001, 70  , 0MCL  JeuxD   , Jeux D'E   , T, 00:00:00.00, 00:30:00.00, 00:30:00.01
[ CLIP   ] [2010-04-28 16:47:08.02 Y, 100000008996, 3   , 0MCL  PathMov, PathMov   , T, 00:00:00.00, 00:08:12.24, 00:08:13.00
[ APP    ] [2010-04-28 16.48.13.20 PLAYOUT COMMAND: STILL
[ APP    ] [2010-04-28 16.48.14.19 PLAYOUT COMMAND: RESTART_FROM_CURRENT
[ APP    ] [2010-04-28 16.48.20.07 PLAYOUT COMMAND: STILL
[ APP    ] [2010-04-28 16.48.23.01 PLAYOUT COMMAND: RESTART_FROM_NEXT
[ CLIP   ] [2010-04-28 16:48:23.01 Y, 100000008998, 32  , 0MCL  Minuet   , Minuet     , T, 00:00:00.00, 00:11:10.24, 00:11:11.00
[ CLIP   ] [2010-04-28 16:52:12.06 Y, 100000009000, 33  , 0MCL  Prima    , Primavera , T, 00:00:00.00, 00:09:19.24, 00:09:20.00
[ CLIP   ] [2010-04-28 16:54:13.12 Y, 100000009003, 49  , 0MCL  Vivace   , Vivace     , T, 00:00:00.00, 00:04:59.24, 00:05:00.00
[ APP    ] [2010-04-28 16:55:16.11 PLAYOUT COMMAND: SKIP
[ CLIP   ] [2010-04-28 16:55:16.11 Y, 100000009005, 51  , 0MCL  OdeJ     , Ode Joy    , T, 00:00:00.00, 00:04:59.24, 00:05:00.00
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[ APP    ] [2010-04-28 16.59.53.01 PLAYOUT COMMAND: EMERGENCY_LIVE_START
[ APP    ] [2010-04-28 17.05.57.05 PLAYOUT COMMAND: EMERGENCY_LIVE_END
[ CLIP   ] [2010-04-28 17.05.58.04 Y, 100000018165, 13  , 0LIVE00001     , Melody02 , T, 00.00.00.00, 00.00.19.24, 00.00.20.00
[ CLIP   ] [2010-04-28 17:09:38.12 Y, 210135629263, 28  , 0MCL  CBBot   , B-Bottles , F, 00:00:00.00, 00:00:14.24, 00:00:15.00
[ CLIP   ] [2010-04-28 17:13:03.21 Y, 210135165919, 30  , 0MCL  DontG   , Don't go   , T, 00:00:00.00, 00:05:10.24, 00:05:11.00
[ APP    ] [2010-04-28 17:15:35.06 AUTOMATION STOP
Log Closed
```

### 5.9 ETERE ALIGNER: Broadcast Synchronization

Etere Aligner is the application that maintains the published schedule constantly synchronized, it aligns the independent automation schedule with the Etere stored schedule, this operation is very important for the broadcast process since published on-air timings may vary and will need to be updated:
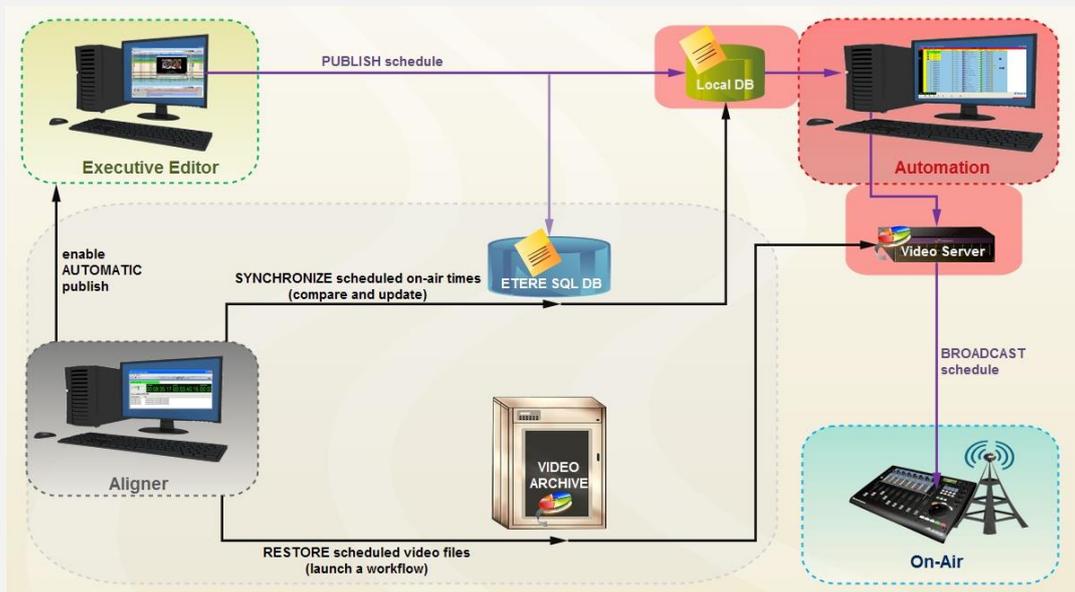
Etere Aligner provides stations with the following key features on managing broadcast schedules:

- Automatic publishing of the schedule by Executive Editor,

- Ensure consistency of the published schedule by updating it with last changes,

- Launch workflows automatically to restore video clips scheduled to go on-air.

In Parameters you are also able to specify that the system also carries out publication of the schedule at each Etere F90 request.

Moreover, Etere Aligner allows restoring via workflow all those video files associated to scheduled events and which are missing in the remote archive, either manually or automatically:

5.10 ETERE BMS: Rights Management

The Etere BMS module, is the place where rights are properly managed, this module allows defining purchasing contracts where a supplier gives to the station the right of transmitting copyrighted media assets (e.g.: tv series, movies, etc) in return to an agreed payment (i.e.: prepaid or at the use) under specific conditions (e.g.: dates, territories, etc).

Etere BMS manages rights and make them available for the entire system, allowing validating programs (for the station and period) at the time of scheduling against the licensing constraints.

Through the use of purchasing contracts, Etere BMS provides monitoring of the rights status of single and multiple assets, giving the station total control over a rights management process which mainly consist in the following procedure:

1. Define the licensing rights of programs creating purchasing orders which are stored in the Etere's database and shared to other Etere modules,

2. Every time an asset is scheduled, it is consulted if the asset counts with the licensing rights to go on-air, warning the operator in case of a negative answer,

3. Once scheduled, licensed assets can be tracked, consulted and paid, giving also access to accurate reports.
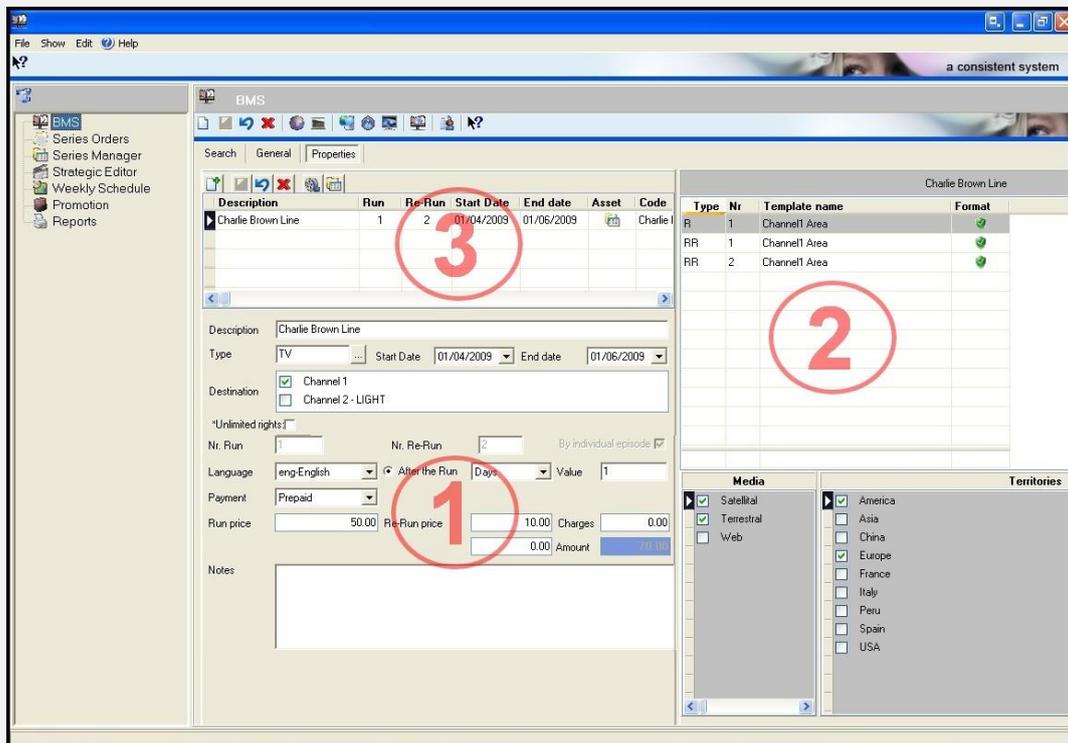
Moreover, Customer Relationship Management is provided by the Personal Data Module, where entities involved in sales processes allowing to define their roles (e.g.: customer, agency, media center, etc), their credit agreements, contact information, invoicing data, etc; thus allowing the entire system to leverage customer contact information during the various commercial processes (e.g. sales process management) for increasing efficiency and productivity:

6. Conclusions

This paper has described how the development and deployment of a comprehensive Etere-based "Total Media Management" system is able to provide the station with a large number of operational benefits and advantages derived from the correct use of ultimate media management technology; Etere will entirely manage the digital contents of the station, from acquisition to delivery, by providing them with the following key features:

- **Workflow Reliability**, all operations automatically generates fully customizable logs to track both the overall and individual functioning of the entire system,

- **Flexibility**, on meeting all requirements by proving a versatile media management system tightly integrated with all capturing and storage devices present on the station,

- **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**, reduced need for repetitive manual operations, allowing to define them in advance and then include them in the ingest workflow, thus increasing productivity,

- **Accuracy**, during the whole media management process, reducing the risk of mistakes when retrieving data since all archived contents are continuously checked.

- **Integration**, Non-linear editing systems will be able to access the digital archive directly and efficiently through a proper production environment, making use of the highest security standards.

Etere is an international leader in the media market. Etere develops and distributes a wide range of high technology software for broadcasting and media businesses. With more than 25 years of experience, Etere provides powerful, flexible, cost-effective, high-performance, end-to-end media solutions. Etere is the only company worldwide that can offer you a solution to all your media needs in one single package.

Etere is the only solution 100% workflow based for all broadcast and media environments. It's a common framework where there is real-time sharing of all the data among several applications to manage all media business requirements. The workflow approach allows a fully customized design with edge performances.

Etere guarantees the best after-sales support service on the market with engineers ready to give professional assistance 24 hours a day, 7 days a week. The service includes voice, email, VPN and VoIP with unlimited calls and connection time, and a pro-active system to help diagnose problems before they appear.

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