Broadcast Automation Without Boundaries

By Ian Cockett -Technical Director

Pebble Beach Systems Ltd
www.pebble.tv

Abstract

The rate of change within broadcast facilities is accelerating. The need to increase channel counts and handle new formats and services, whilst simultaneously lowering staff count, provides today's broadcasters with many challenges.

Broadcast automation systems have been deployed for over 20 years to help manage that change, and to achieve tasks that would not have been possible using manual labour. From the early uses of automation to control robotic tape libraries through to today's use of IT servers which manage hundreds or thousands of terabytes (TB) of data, broadcasters have steadily become entirely reliant on software systems.

This paper examines the challenges faced by today's broadcasters and outlines an enterprise approach to broadcast automation that helps solve these problems, allowing broadcasters to combine their legacy broadcast hardware with the latest integrated channel-in-a-box solutions. By providing integrated platforms that are extensible, capable of integration with other business systems and that can grow as a broadcaster's requirements change, we can achieve "automation without boundaries".

Introduction

In recent years, the trend in television broadcast has been towards 'tapeless' production and transmission. In some cases, tape has not yet totally been eliminated as it is still an important means of delivering long-form content. Present-day workflows should perhaps be described as 'less-tape' rather than 'tape-less'. However, most broadcasters now play all of their content to air from disk-based servers.

The broadcast industry traditionally used proprietary hardware solutions; but the convergence of off-the-shelf IT, storage and video compression technology means that today it is perfectly possible to broadcast an entire HD channel, including complex 3D graphics, from a single PC.

Today's modern broadcast facilities are typically made up of many different IT systems: from scheduling and traffic systems, control and monitoring systems through to content management, ingest, archive management, playout automation and content delivery systems. It is not uncommon for broadcasters to have multiple systems from different vendors each doing a similar job: for example, multiple automation systems or media asset management systems.

In addition to having many different control systems and databases, present-day broadcasters also typically still have large amounts of legacy hardware that will need to be controlled for several more years to come.

Automation Is Changing

10-15 years ago it was not uncommon for automation systems to go on-air and remain relatively unchanged for 5 years or more. Except for the occasional hardware failure or software update, the basic operation and workflow of the system might not have changed from when the system was first installed. However, most broadcasters, service providers and system integrators will testify that this is no longer the case. Constant demands for improved efficiencies, additional channels with differing requirements, new services and features mean that today's broadcasters are faced with an ever-increasing rate of change.

The list of new problems to be solved seems almost endless:-

- New channels to be launched without increasing headcount
- More frequent changes to presentation style
- Multiple formats to be handled e.g. SD, HD
- Multiple file formats and wrappers to deal with
- Multiple aspect ratios e.g. 4:3, 16:9
- Multiple audio formats e.g. different languages, Dolby 5.1, Dolby E
- Multiple databases to consider
- Multiple distribution requirements
- Localized delivery of content

In summary, everyone now has to do more with less. Nowadays, in many stations, broadcast departments are faced with almost weekly requests for change to their operations and systems. But what prevents us from adapting our current systems and what obstacles prevent us from changing?

It is worth considering some of the issues that are currently preventing broadcasters from dealing with this accelerated change and from delivering the new features being demanded by their businesses.

Limitations in existing platforms - both software and hardware

Many broadcasters employ software and hardware that were designed around tape-based workflows and followed a traditional model where all content arrived at a facility on tape. Workarounds are made in order to appease systems that were only ever designed to work with tape-based content. Frequently, these legacy systems are close to end-of-life and cannot be economically supported or easily modified by the original manufacturers. In many cases, the original developers and architects of the system are no longer available to assist with this process and change.

Poor interfaces

Many of the existing systems in use today by broadcasters are 'black box' systems with closed databases which offer few possibilities for integrating with other systems. In some cases broadcasters have had to resort to reverse engineering methods, or have used home-grown tools to extract or transfer data and to provide some custom control interfaces. Typically, those interfaces that do exist on legacy systems use difficult to modify interfaces and use binary or proprietary file formats.

Limitations in existing system architecture

Many existing systems are built around building blocks with fixed capabilities, such as 'x' cards per frame, 'y' serial ports per chassis or 'z' playlists per system. In addition, within the software domain, the number of client workstations that can be used or the number of IDs that can be managed might be limited.

To overcome the limitations of hardware and software, systems are separated into 'pods' or 'islands' each capable of managing a set number of broadcast channels, for example. Whilst this approach means that large systems can be built, the limitations within each pod are clear – it may not be physically possible to add a 65th serial port or a 17th playlist in that pod.

Reluctance to change 'working' systems. (If it ain't broke don't fix it)

Complex systems inevitably take significant time to build and integrate. Once a system is running well (or is at least stable, but with known limitations!) the age-old engineering mantra of "If it ain't broke don't fix it" often comes into play. Engineers are often afraid, for good reasons, of destabilizing working systems and tend to lean towards building separate new islands in order to meet new business requirements. Consequently this leads to yet more islands appearing in a system, perhaps using equipment from different vendors with little or no communication between existing systems.

Fixed or inflexible workflows

A problem experienced by many existing systems is that the existing workflows are very inflexible. For example, it may be necessary to strictly follow an ingest process within a system in order for the content to be played out correctly. This might be a serious limitation in the case where fully QC checked, TX ready files are available and can be downloaded directly to a playout server. If the existing system cannot handle these files, the possibilities for changing the workflows and building file-based workflows are extremely limited.

In addition to problems playing out this content, there may also be problems with clips that have been delivered as files being deleted by the existing media management system, as the media is seen as foreign by the existing system.

Expert knowledge needed to maintain multiple systems at all levels.

Often broadcasters rely on a small number of experts who really understand all of the interactions between the various systems in their facility. In some cases there might be just one person with that knowledge – which is obviously a significant limitation for a business. Simply being able to work out whether it is safe to switch off a piece of equipment for routine maintenance can become a non-trivial task. Today's systems seldom give an overall view of all of the resources that are currently being used within a system, making them difficult to manage.

Multiple databases with little or no interchange of information or metadata.

Today's systems are usually characterized by having quite a limited amount of metadata which is fragmented between several dissimilar databases within the broadcast system. I have seen installations where the same data is stored in 5 or 6 databases with different field names, different field lengths etc. in

each one. Modifying systems such as these in order to add new metadata or features, is extremely difficult and time-consuming.

Marina - an Enterprise Broadcast Automation solution

Since its inception, Pebble Beach Systems has strived to extend the scope of playout automation systems by combining the roles of media and archive management with playout automation into one integrated system. This is typified by our Neptune product which has successfully been deployed by broadcasters in over 50 countries worldwide.

Pebble Beach Systems has developed a new kind of automation architecture which addresses the needs of today's broadcasters and provides the flexibility they require for the future. Whilst delivering all of the essential features needed by a playout automation system, the Marina platform extends both upstream and downstream in the broadcast chain to encompass:-

- Content capture
- Content/Media Management
- Archive Management
- Automated Workflow Management
- Playout Automation
- Automated Dynamic Channel Branding
- Content Delivery

Rather than utilize multiple disparate systems from several vendors, broadcasters can centralize content capture, content management, workflow management and playout functions in a single, extensible database.

The Marina platform is designed to integrate with legacy hardware and systems whilst leveraging new technologies and devices such as integrated channel-in-a-box servers.

Marina Features

Distributed Architecture

Marina uses a client-server architecture which means that the client applications are simply used for viewing, monitoring and interacting with the servers - where the actual work is being done. Multiple clients can be used from multiple locations, wherever interaction is needed with the system. Marina also features a distributed server architecture which means different components of the system can be physically separated onto additional servers as and when required. The services and components that make up the system can be distributed or hosted on any of the servers in the system.

This brings many advantages for installers, integrators and operators as it allows logical system functions to be separated or abstracted away from the limitations of the actual hardware. So in the case where

additional CPU power is needed, or other resources such as additional serial ports are required, extra hardware can be added where it is needed without affecting the operational aspects of the system. In a traditional system, broadcasters may be forced into adding and staffing an additional workstation or control room, so that changing the physical hardware has a big impact on the operation and usage of the system. Marina's distributed architecture also offers additional redundancy benefits such as being able to separate control of air and protect server streams between 2 different device servers, and dual Network Interface Cards can be used to provide protection against a LAN failure.

There are also other architectural benefits such as being able to have local device control elements at a remote site, which has interesting possibilities for disaster recovery installations. As a system grows, the hardware platforms can therefore be easily scaled to match its changing requirements.

Virtualization

Marina's architecture is designed to support nodes and system resources which are dynamically created, that is to say resources that are started and stopped whilst the system is running. This is an important aspect in being able to support server virtualization technologies that can automatically failover servers and provide new system resources whilst the system is on-air. Without this ability to add new services on-the-fly, a user would be required to restart the entire system if some new resources or hardware were added to the system.

Open Interfaces

Marina provides several service-orientated interfaces based on web services that can be used by customers or integrators to build complex systems which integrate tightly in an SOA environment. For example, interfaces exist within Marina that provide:-

- Complete read/write control of the playlist
- Read and write access to media metadata including creation of placeholders records
- Access to live media usage information such as a real-time prioritized missing media list for the entire system
- Media movement and archive requests from an external system
- Creation of custom media movement and deletion rules
- Creation of custom queries and reports

The strength and depth of Marina's interfaces provide customers and developers with a powerful platform on which to build complex systems. This is especially beneficial for customers or system integrators who have their own software developers, or indeed for broadcast equipment manufacturers such as companies providing complex graphics workflows, who wish to tightly integrate the playout automation with their own workflow systems. Whether this is to integrate the automation system with existing systems in a broadcast

facility such as EPG or media management system, or to develop interactive TV applications, the interfaces within Marina provide the tools required.

<u>Flexible Workflows</u>

One of the most important aspects of any successful software product is the ability to function in many different workflows and environments. Typically broadcasters have developed their business practices over many years and no two organizations work in exactly the same way. Pebble Beach Systems understands this and has always adopted a customizable approach for its products. If the feature required by a customer cannot be delivered by configuration alone, custom plug-in modules can be used throughout the system to provide highly specialized features. This enables customers to benefit from a reliable, extensively tested, standard product whilst being able to get the specialized features they require.

Marina enables users to:-

- Configure additional classification fields, categories and screen layouts in order to handle custom metadata.
- Configure custom queries and reports and save them for easy recall in the future.
- Build multiple automated workflows that manage the handling of media assets as they pass through the system
- Combine multiple workflow steps to provide complex tasks such as archive restore and partial restore functions combined with EDL conform and transcode functions.

Marina - an enterprise solution

Wikipedia defines enterprise systems as, *"large-scale, integrated application-software packages that use the computational, data storage, and data transmission power of modern information technology (IT) to support processes, information flows, reporting, and data analytics within and between complex organizations.".* Marina provides a platform for managing complex broadcast systems through a single GUI which combines an "access anything from anywhere" approach with the detailed resource management and reporting information required by today's cost-conscious broadcasters. It delivers:-

- Extensive user and group access rights management.
- Roaming user profiles. All client preferences and access rights are controlled by a user's access rights allowing control and administration tasks to be performed from anywhere
- Detailed resource utilization information which covers both media usage and device usage
- Remote health monitoring of all servers and server resources such as memory and CPU usage
- Centralized software update and management control
- Full Unicode compliance – including full localization of the user interfaces into any language.

Conclusion

The typically heterogeneous nature of many current-day broadcast systems makes the management of change difficult, inhibits integration possibilities and adds complexity and cost. In using up-to-date software techniques and platforms, Pebble Beach Systems has refined the scope of playout automation by combining many of the features traditionally only found in large-scale media and content management systems with its best-of-breed transmission automation solution.

By taking an enterprise approach and understanding that broadcasters need to be able to manage traditional broadcast devices such as VTRs, switchers and video servers as well as the latest integrated channel-in-a-box devices from within the same system, Pebble Beach Systems has opened up many new possibilities for its customers. For the first time, automation systems need not be thought of as impenetrable black boxes. Marina provides automation without boundaries.