Solving the TV Station Hardware Dilemma

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INTRODUCTION

Owners of television stations, like most private businesses, always seek means to increase revenues and reduce expenses (CAPEX & OPEX). Doing so, however, has been even more of a priority, if not a necessity, because of the turbulent economic climate presiding over the past few years. In large part, the difficulty in achieving this dual requirement is tied to the large amount of expensive dedicated broadcast hardware that has to be purchased and operated. Even as stations moved into the digital age, the standard analog hardware did not just disappear; it simply morphed into digital hardware, with its own significant costs.

Over the same past few years, however, a new opportunity for the broadcaster has emerged to significantly reduce the hardware requirements of a station or group of stations, whereby longstanding dedicated proprietary hardware-based systems can be replaced with less expensive software-based solutions running on commodity IT hardware, which are also easier to operate and maintain. Florical Systems, in fact, a company with 25 years of experience, is one of the first to pioneer such a hardware-chain collapsing solution when it introduced Acuitas at the 2006 NAB show, winning the Broadcast Engineering's Pick Hit award in the process.

FROM HARDWARE…

The evolution of television from a technical standpoint has paralleled that of the computing industry. They both started with the need to operate with very large, very expensive, task specific, proprietary hardware to generate their respective output. In the IT world, this evolution, however, has grown very rapidly, providing lower cost with increased performance, as expressed by Moore's law, compared to that of television.
This ball and chain for the broadcaster, which broadcast hardware represents, has made it very costly for the stations or groups to scale with the increasing number of channels they wish to operate or to consider other revenue streams, as technologies and business models appear. This equipment can only be purchased, operated, and maintained at great capital and operational expense. The stations must have technicians and engineers on staff who need specialized skills and training that have to be maintained thru continuing education; there are fees from the equipment vendors for installing, supporting and upgrading this equipment.

While not happening as fast as Moore's law for computing equipment in the IT domain,

television broadcast equipment does eventually become obsolete and must be replaced. New technologies that appeal to end users or that may become FCC mandated items often require the broadcaster to adapt and acquire new hardware, which again will typically be expensive, proprietary and of limited reuse. The conversion to digital has been such an example sprung forth from a federal mandate. More recently, due mostly to consumer demands, and still high on the list of concerns to the broadcaster, is the conversion of the plant equipment to HD. These costs are especially onerous to station groups where remarkably the expression "cost of scale" seems more appropriate than the more traditional and expected expression "economy of scale", as the cost of an HD conversion is essentially multiplied by the number of stations in the group. Similarly, recent interest in Mobile DTV, as a new revenue stream for the broadcaster, has its own associated hardware costs.

Broadcasters have not had much of a choice in the matter; even as some of the equipment morphed from a tape- or film-based technology to a more file-based technology, it still comes with its associated burden of being expensive, dedicated and proprietary, if maybe less bulky. Trading huge cart machines for smaller broadcast video servers has its advantages but is no panacea for the hardware dilemma. This evolution, however, was tolerated, if not justified, as long the profit margins for the broadcaster were good. Nevertheless, the industry, within this hardware paradigm has had to try to minimize this burden because of overall economic conditions (recession) and the challenge created by the increasing competition and popularity of new, software-based, and more agile media and entertainment platforms (smart phones, internet…), which affected significantly their bottom-line.

Therefore, groups, for example, have tried to make good on the expectation of economy of scale by looking at centralizing their broadcast playout operations to reduce CAPEX or OPEX or both. Various flavors of centralization provide for various levels of CAPEX or OPEX savings. Florical Systems, since the early 90's, has helped successfully several groups deploy these various forms of playout centralization. The centralization theme for groups has also been extended to other aspects of their broadcast operation, such as centralizing the creation of graphics and promotions, or the distribution of content. On a smaller scale, stations have also transitioned to newer equipment that could perform the function of several. For example, master control switchers have evolved to take on the duty of handling branding and DVE effects, duties previously assigned to dedicated standalone platforms. Newer file-based technologies have also allowed the acquisition of long-form and commercial content to be delivered electronically directly to the station, replacing, or at least minimizing, recording from satellite or from tapes, which are equipment and operator intensive.

These attempts at solving the hardware dilemma, while providing significant savings at times, have been more like an evolution rather than a revolution, not only in terms of savings but also in terms of the technological improvements. The broadcaster needs a better solution; one that may be revolutionary, but easy and cost-effective to transition into.

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...TO SOFTWARE

Even though the television industry has not really had its own Moore's law, which has cata-pulted the computing industry forward so much, the benefits of that law for the IT indus-try, nevertheless, have been spilling into the world of the broadcasters over the past few years. Functions which previously could have only been handled by expensive dedicated proprietary hardware-based systems are now deliverable on less expensive software-based solutions running on commodity IT hardware. Other industries have already leveraged this remarkable advancement. The television industry, however, because of its intensive video and graphics requirements had not been able to do so to the same extent, only making increasing use of software as means to control or manage broadcast-specific hardware. In the radio industry, where audio requirements are significantly simpler, this benefit of an all IT platform has already been taken advantage of.

The ability to encode, decode, transcode, transfer, repurpose and otherwise process video is now available on off-the-shelf computing hardware with the professional quality expected by the broadcaster for frame-accurate real-time delivery of content across various platforms. Florical's Acuitas, as discussed below, is such a software based solution that integrates A/V content acquisition, presentation, and management, in combination with the already exist-ing, very reliable, feature-rich, and widely used standard Florical automation.

Interestingly, concomitant to this hardware-chain collapsing revolution brought forth by the aforementioned advances in computing hardware performance, another revolution had been taking place in the software world itself, one that addresses an issue that has affected the broadcaster from the moment computers started to appear in television stations. Specif-ically, the broadcaster has had to face the problem of the disparity of software components within the station and the lack of harmony in their interoperability. Progress has been made in this area by leveraging the software industry paradigm of Software Oriented Architecture (SOA). Several broadcast vendors have begun to provide products following SOA practices, including Florical with its SMART Central Web Service based suite of applications, which will be described in a separate white paper, but much work remains in harmonizing the inter-faces between the various vendors' offerings. In fact, recently, the Advanced Media Work-flow Association (AMWA) and the European Broadcasting Union (EBU) have started a process to "address issues around interoperability in digital workflows" as announced in this AMWA/EBU joint press release: *http://www.amwa.tv/news/press/pr_20100426.shtml*

We believe this confluence, on the one hand, of the collapse of the hardware chain as dis-cussed above and, on the other hand, of the parallel software trend of leveraging service-ori-ented frameworks, whereby standard off-the-shelf plumbing for communications between services frees up development's focus on the business logic, should provide broadcasters with the vision of their new broadcast facility.

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ACUITAS

The video processing component of Acuitas provides for all the functions that are needed and expected by the broadcaster when putting content to air in SD or HD. It is a broadcast quality video server, a branding device, a master control switcher, and a DVE box, hosted on truly off-the-shelf IT hardware, without any custom chip sets or other proprietary modifications. It can handle ancillary data, aspect ratio conversion, multi-format mixing, EAS, school closings, weather alerts, Nielsen watermarking and other useful broadcast functions.

Because Acuitas comes with the standard Florical automation, it can still interface with existing external hardware or systems that the customer wishes or needs to retain. All the benefits of Florical's well-proven automation system, used in major call-letter stations and groups, are available as part of Acuitas, but now they integrate seamlessly with the video processing component of Acuitas for a complete and affordable solution: a true all IT "station-in-a-box". Acuitas is therefore a very flexible solution that can be used for primary and secondary channels of call-letter stations or as part of a group playout or ingest centralization effort, as well as cable outfits and other specialized applications. It integrates seamlessly with Florical's wide array of content acquisition tools. Current Florical customers, obviously, have the advantage of leveraging their existing Florical automation when they move to the Acuitas platform, with no need to purchase a new automation system or having to retrain personnel, compared to other "station-in-a-box" solutions. New customers can also first upgrade their automation system to Florical and later phase out their current hardware by adding the Acuitas server components as needed; this can facilitate a broadcaster HD conversion or a group centralization effort by spreading the capital investment over a period of time, optimizing their depreciation concerns.

The number of Acuitas components actually involved in a given installation depends on the requirements of the customer, in particular with respect to the number of channels, the volume of tape or satellite ingests or file-based acquisitions, and the level of redundancy desired. The basic components consist of ingest servers and playout servers, which can handle by themselves the storage capacity for smaller systems or which can access a shared storage of an appropriate size and bandwidth as needed, and of a file system server. All these systems use off-the-shelf HP server class chassis and Matrox SD/HD multi-channel video cards for the I/O.

The ingest server has 3 SD/HD encode channels combined with 2 SD/HD decode channels, which can be used for baseband recording and review, content approval of file-based acquisitions and timing.

The playout server has 2 SD/HD decode channels, each paired with 2 SD/HD inputs for live signals from an external router, which allows for switching with transitions. It also supports

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important branding and video effects functions.

The shared storage can be network attached in a SAN or NAS configuration or directly attached in a multi-client DAS configuration to the Acuitas servers to provide them with additional storage.

The file system server typically hosts the Microsoft SQL database engine that provides access to the Florical media content and playout schedules databases, as well as hosts several key Florical automation Web Services like SMART Central in particular.

The Florical automation software may run on these Acuitas components or separately depending on the customer configuration. An Acuitas data-sheet is available for more details on the specifications of the Acuitas servers: http://www.florical.com/products/acuitas/

CONCLUSION

Broadcasters, at this juncture, are in a position to contemplate a way out of their hardware dilemma. Such a solution, as described in this paper, with less expensive software-based solutions running on commodity IT hardware, coupled with the deployment of service-based software solutions within the broadcast facility, are now available to the broadcaster. With all the current and future threats bearing on broadcasters, minimizing the hardware/software footprint cost is key; we hope the approach presented here provides broadcasters with a strong option to meet this goal.

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