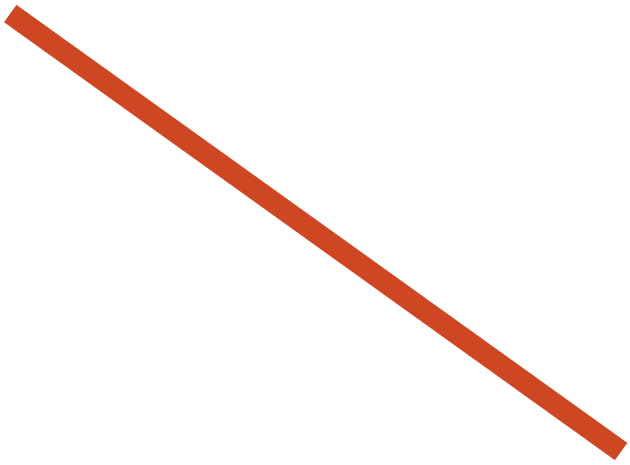
BROADCAST
THE BRIDGE

The Liberation Of Broadcast Technology



Essential Guide

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ESSENTIAL GUIDES

Introduction

For many years broadcasters have been working with static systems that are difficult to change and upgrade. Although we have video and audio routing, the often-tangled mess of jackfield patch-cords is testament to how flexible broadcast systems really need to be to meet the demands of modern program making.

The static nature of infrastructures has been imposed on broadcasters due to the technical demands digital video in particular places on distribution. But these limits also manifest themselves in audio infrastructures. The human hearing system is incredibly sensitive to the smallest audio distortion so networks must be incredibly reliable as we can't afford to drop even one packet of audio.

Up to recently, the video and audio networks were dedicated infrastructures based on SDI and AES. However, the speed improvements COTS infrastructures have now delivered are transforming both the way we distribute video and audio, and also how we process it.

It's almost impossible to keep a studio running 24/7. Even if we allow other studios to use key equipment such as the production switcher or sound console, the nature of television means that resource demand is very peaky. Consequently, broadcasters must plan for the maximum peak demand, often leaving expensive infrastructure devices unused for large periods of the day and night.

Moving to COTS hardware infrastructures helped solve some of these challenges as the equipment tends to be more affordable and has less customization. The unique nature of SDI and AES requires hardware interfaces that are specific to the operation of each device in the video and audio processing and distribution chain. SMPTEs ST-2110 and ST-2022 suite of protocols helped solve many of these challenges as they removed the need for a custom interface such as those required for SDI and AES, replacing them with more commonly available Ethernet interfaces.

One of the key advantages of COTS infrastructures, other than the fact that it has a greater reach in industry and is therefore more readily available, is the software that runs on it. The processing speed and data throughput of COTS hardware means we can now run software that can reliably process video and audio in real-time. Software packages providing a whole host of functionality is now available on a common platform to further improve resource utilization.

Building on this, flexible software licenses are now ready to enable or disable functionality within a single software distribution. These licenses further improve flexibility as they can be purchased on a pay-as-you-go basis. This improves on standard software installations as a global version of the code can be installed leaving its functionality to be enabled as required by the software licensing.

Tony Orme.

Software defined studios are now within our grasp as we progress beyond COTS infrastructures to global software and flexible licensing. This Essential Guide discusses the need for flexible licensing, how it works, and a hint at some of the new flexible working practices now available to us.

Tony Orme
Editor, The Broadcast Bridge

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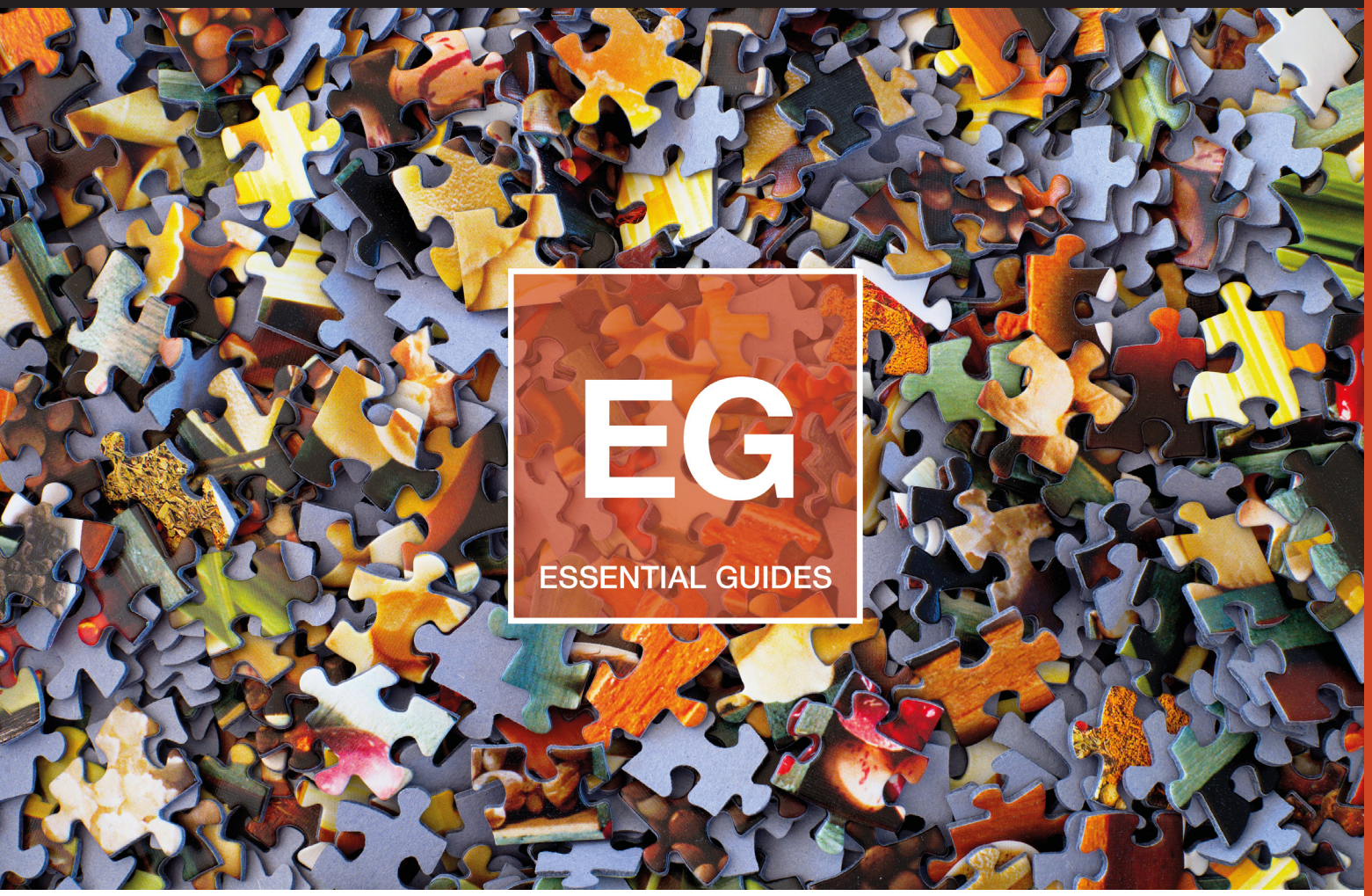

By Tony Orme, Editor at The Broadcast Bridge

Recent developments in IT systems has seen COTS infrastructure not only meet the demands of broadcasting, but also exceed it. High performance computing and ISP grade ethernet switches have all contributed to making IT work for broadcasters. However, another revolution is taking place - the adoption of flexible and floatable software licenses and the business models that finally allow broadcasters to maximize asset utilization. In this Essential Guide, we investigate this phenomenon and the advantages flexible and floating software provides for broadcasters.

One of the great advantages of software is that Agile development cycles are incredibly short and continuous when compared to the traditional Waterfall method. Agile practices focus development teams on delivering operational features as they are needed - resulting in software that meets the never-ending demands of the user. Alternative Waterfall methods of project management result in code being delivered that is often out of date and provided many months or years after the first product concept is delivered.

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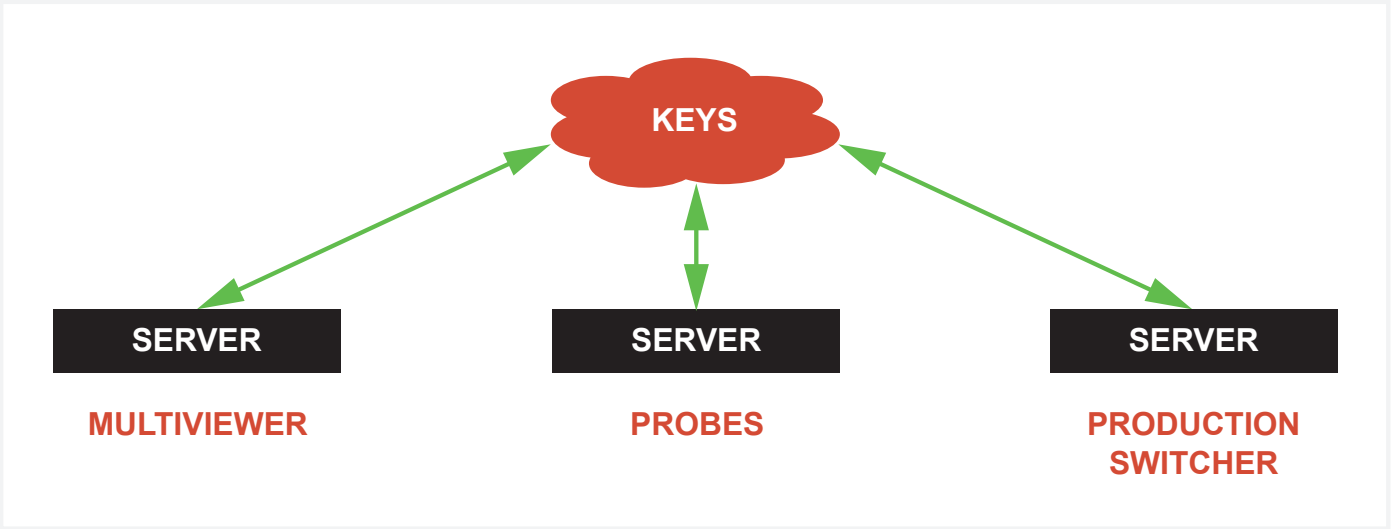

Keys can be distributed from the cloud as well as centralized servers. This greatly improves flexibility for broadcasters allowing them to dynamically allocate resource to build systems quickly and on-the-fly.

Broadcast hardware is traditionally custom by design. In part, this is a necessity as the relentless video streams take electronic designs to their limits to deliver the video bit rates needed to give us fluidity of motion and vibrant colors. This equipment is so specialized that it is almost impossible to repurpose and often goes out of date soon after it is installed.

Better Hardware Utilization

Utilization of broadcast hardware is quite limited as each device in the program chain can generally do one specific job and this is often within very fixed parameters. For example, the scaler and splitter hardware used for a multiviewer uses very specific dedicated hardware and is limited to that particular function.

Developments in High Performance Computing have succeeded in taking COTS computer hardware to unprecedented performance levels. Not only does high performance COTS equipment meet the requirements of processing real-time video but it often exceeds it.

This all leads to a change in the way broadcasters can now work but it does demand a new mindset. Instead of building systems using dedicated hardware components with fixed point-to-point networks that culminate in high costs and static systems, we should be looking to COTS hardware and flexible licensing as we can have clusters of hardware that provide a solid platform for real-time video processing in software. The ultimate flexible experience.

Software Management

Maintaining software is often a challenging and difficult task. Technically it should be very easy as vendors have made applications that will copy the relevant files and delete any old ones. It's often the administration of software maintenance and the associated versioning control that makes the job difficult.

Having one version of the code that provides many features helps with this task enormously as there is only one installation to update. Although the code still needs to be uploaded and installed, having just one version that provides many different functions that can be enabled through flexible key control, simplifies the task completely.

Change Control

ITIL (Information Technology Infrastructure Library) processes used by professional IT departments require change management. In its simplest form, this is a document that highlights a change control, such as a software upgrade, that requires all users of the service to agree to and sign up to. This alone can cause incredible delays and will often outweigh the benefits gained by Agile development. Furthermore, there is often appreciable downtime for integration testing and verification.

Agile development has traditionally lent itself well to web-server type products. Using virtualization and load balancers, web servers can be updated on-the-fly so that there is no perceivable loss of service to the user.

More recently, this methodology has become available to general applications through the use of distributed code and flexible licensing. The core software must be built to support this, but essentially, single release provides all the functionality offered by the vendor and each function and feature is released by the licensing key.

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Functionality Distribution

Working on COTS hardware and within a well-defined software structure and environment, vendors can make a whole host of licensed functionality available to broadcasters. The functionality can be exhaustively tested during the development phase meaning they are bug free when made available to the broadcaster.

Each server has a copy of the same code and from a central repository providing the complete software deployment. The features are easily available as they are disabled until the unique keys are entered into the core software to enable them. This further enhances code compatibility across multiple clients making versioning much easier for the vendor to administer which in turn will make the code more reliable.

Furthermore, the keys can be enabled and disabled as required and can even be time referenced so they only provide a given functionality for a specific length of time.

Workflow Requirements

Vendors and broadcasters are often at the two ends of a tug of war. The vendors want to provide as few versions of the code as possible to both improve efficiencies and reliability. And the broadcasters, with their unique workflows want to make the code as unique as possible to meet the specific requirements of their facility.

Flexible code licensing provides solutions for both vendors and broadcasters as the licensing key is designed to enable features for specific broadcasters. For example, one broadcaster might want their multiviewer instance to provide error detection reports using XML files and another broadcaster might want to provide the same reports using JSON files. The same code will provide both of these solutions but only one option is available to each broadcaster through key management.

However, this philosophy can go far beyond simple versioning control and feature availability as entire applications can be managed. Again, one version of the code is available, but many features and functions are distributed in the code waiting to be unlocked. The same version of code may include a multiviewer, analyzer probe and production switcher, and the keys provided by the vendors enable the feature purchased.

COTS Stability

The key here is to remember that the whole code runs on COTS hardware, so many assumptions about the underlying hardware can be made by the vendor. A minimum specification must be defined, but the vendor will test their code on a known hardware platform to further improve reliability.

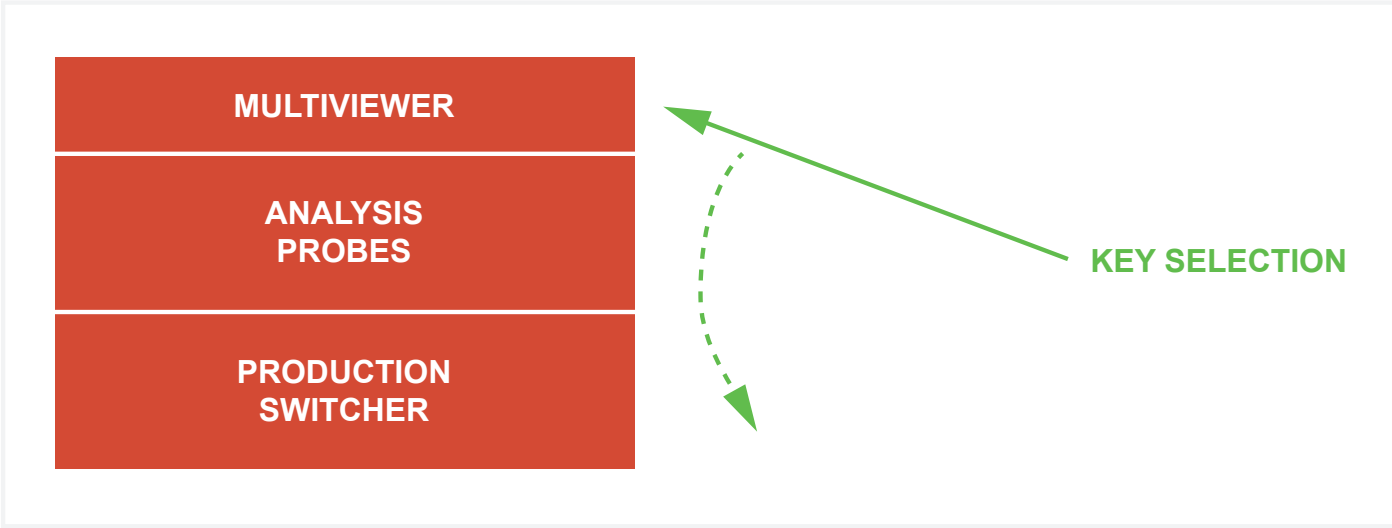
Distributing one version of the code to all broadcasters drastically improves reliability. One of the challenges vendors have is understanding and testing for all the different permutations and combinations of code and client specific requirements. If these can be better understood, then the vendor has a better chance of providing reliable software testing.

This reliability is further improved through the specification of hardware. COTS is an all-embracing term that can cover many hardware specifications and these need to be well defined. But this is nothing new, high performance computing has been working like this for a long time.

Flexible licensing combined with a single version of code also provides the concept of peak demand optimization for complete broadcast infrastructures. As licenses release the features of the code on a per license basis, system administrators can choose how, where and when to deploy the individual product features in the code.

Dynamic Systems

To truly benefit from COTS infrastructures, broadcasters must employ dynamic systems. Through virtualization, servers can be spun up or deleted as and when required. Traditionally, broadcast infrastructures have been built to meet peak demand and this is one of the reasons they are so expensive and rigid.



A single software version makes available multiple functionality that is released by vendor issued keys.

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Studios, graphics, playout and master control have all historically been designed to do one specific job. The equipment and infrastructure have been built to meet the peak requirements, but the peak demand is rarely met. For example, a studio with a multiviewer would normally have a dedicated multiviewer hardware solution providing the functionality. However, despite the best efforts of schedulers, the hardware may only be in use for a few hours a day. It's likely that the studio wouldn't be in use overnight.

Although this is a fairly simple example, it does demonstrate the inefficient use of high value hardware in a broadcast facility. Furthermore, this "waste" may be replicated many times throughout the facility as systems are designed to deliver for peak demand.

Peak Demand Optimization

Learning from the IT industry, broadcasters can see how virtualization is used to provide the best of all worlds. Peak demand is still met as virtualized servers can be spun up and deleted as needed but the hardware usage is spread over the whole facility.

Flexible licensing further expands on the virtualized model. Pools of licenses are made available to system administrators so that individual licenses can be deployed as and when needed. This concept is even more powerful when we consider the deployment of a single code instance that contains multiple functions such as a multiviewer, analysis probes and production switchers.

It might be that the data throughput of a function is so high that a particular application does not lend itself well to virtualization and so dedicated servers must be used. Even with this model, the server can multi-task and with the correct code can provide many different functions. Although the server may be located in a specific location within a facility, through high speed networks and flexible licensing, its physical location and application have essentially been separated, thus allowing it to be "moved" not only to different studios within the facility, but also used for different applications.

Code Centralization

Installing the code on a server is much easier than the traditional methods of software maintenance. As only one version of the code is required, it may well be installed on a centralized server and loaded locally onto the application server when it is enabled. This greatly simplifies software maintenance as only one version of the code needs to be installed.

A broadcaster may purchase a thousand or more licenses and make them centrally available. As the license is effectively a computer file, it may be deployed by an automation system. This opens up a whole new load of opportunities for broadcasters looking for ever greater efficiency improvements.

Software Configuration

With the correct COTS server farms and associated high speed networks, the whole infrastructure could be abstracted to a fully flexible software-as-a-service solution (SaaS). The granularity of control could be as varied as the broadcaster requires. In the extreme, specific TV-shows can be programmed and made available through a scheduling system.

Flexible licensing empowers broadcasters to make the best of dynamic systems and fully optimize their use. The speed with which agile development makes new features available is breathtaking and the single code model further improves efficiencies and flexibility as a common version of the code can be deployed over many servers.

To build efficient infrastructures, broadcast engineers and administrators need to start thinking in more abstract and flexible terms. The traditional rigid peak demand broadcast infrastructures of the past are now history and to gain the efficiencies COTS promises, we must look to exploit dynamic systems wherever possible. Flexible licensing and single-code deployments deliver this.

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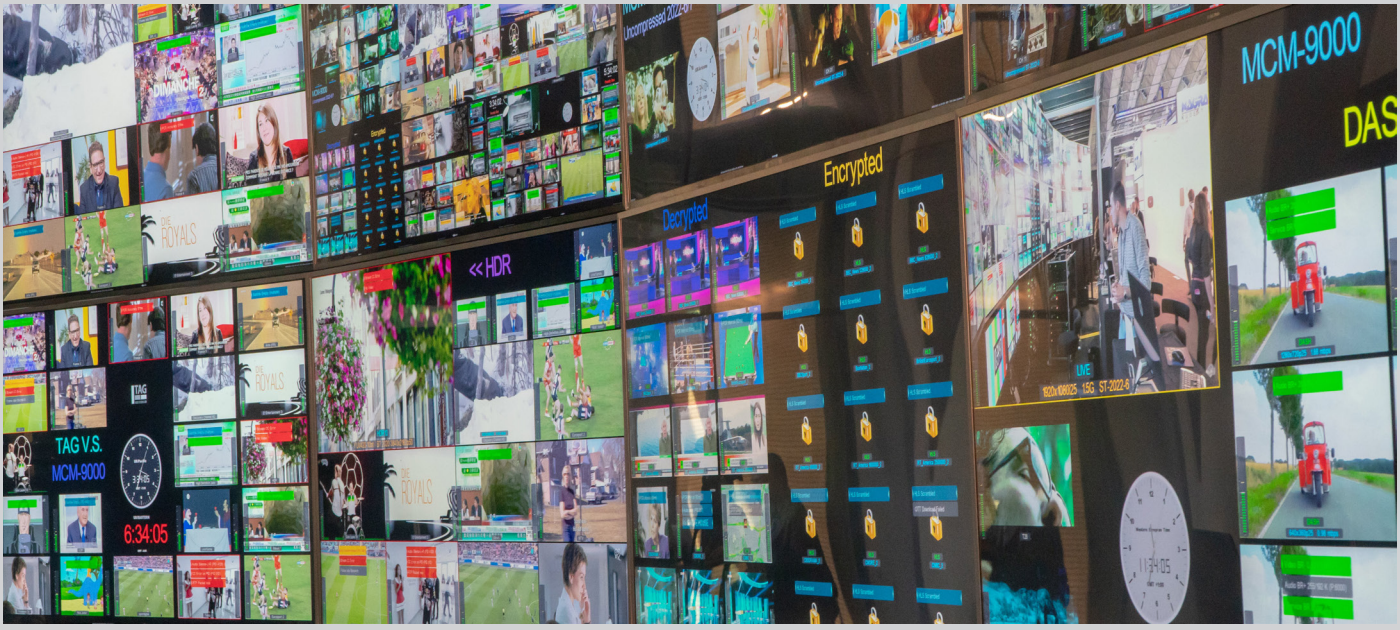
The Sponsors Perspective

TAG Video Systems Introduces New Business Model For Broadcast Technology

By Michael Grotticelli, The Broadcast Bridge

With the emergence of the cloud into the media production and delivery space, the broadcast and media industry must embrace an entirely new approach to acquiring and deploying technology. Large capital expenditures (CapEx) are increasingly being replaced by operating expense (OpEx) budgets that are more flexible and aligned with the operational requirements of broadcast facilities.



Recognizing the value this approach offers Broadcasters and media providers, TAG Video Systems launched a new business strategy called “Zero Friction” that takes a multi-functional technology platform (the MCM-9000 monitoring, probing and multiviewer system) and adds the freedom to use that technology anywhere, anytime for as long as you’d like.

Kevin M. Joyce, Zero Friction Officer at TAG Video Systems, calls that the three pillars of the Zero Friction concept …. multi-functional technology, operational agility and the business model to back it up.

The industry is shifting from a Capex to an OpEx model, “We’re not only allowing you to move to OpEx, we are optimizing the utilization of the client’s assets.”

Most live production assets are utilized less than 50 percent of the time. Under this new business model, a customer that does live production in London in the morning can deploy the same technology in in New York in the afternoon and only use one license.

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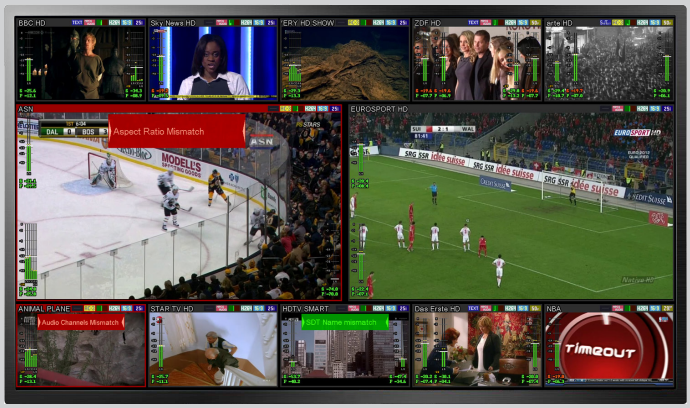

"Customers have been telling us that the old model of buying and operating broadcast technology was not sustainable," Joyce said, adding that OpEx models represent a different way of thinking about broadcast operations. "You can't have assets be deployed and only used 50 percent of the time. That's when we realized CapEx and OpEx was not the point. That's just a different way of paying for something. OpEx models allowed us to think beyond finance and focus on operational and business models."

TAG's software started as a product focused mainly on content delivery, but now handles all four of the major broadcast applications: live production, playout, delivery and OTT. It works with both compressed and uncompressed video and supports all major industry standards such as SMPTE ST-2110, ST-2022- 6/7, JPEG 2000, MPEG TS, DASH, HLS and CMAF. The technology is also available in the cloud, working closely with platforms like Amazon Web Services (AWS), Azure & Google.

The company was launched in 2007 with an IP-based probing and monitoring platform, until one of its customers, a large network operations center (NOC), asked if it could develop a multiviewer as well. TAG came up with a software-only system that did just that, leading to customer wins at other NOCs across Europe. Years later, Sky in the U.K., which was using the TAG multiviewer for compressed workflows, asked it to develop a similar product for uncompressed SMPTE ST-2110 workflows.

The media giant was also looking for low latency with the highest resolution UHD/4K and it all had to be done in software, IP and COTS. At that point such flexible technology did not exist in the market. So, TAG developed an uncompressed solution that allowed the company to target other broadcast applications. Today, Joyce said, TAG is still the only monitoring, probing and multiviewer system on the market that is 100 percent software, 100 percent IP, and 100 percent cloud or on-premise COTS hardware based.

"The TAG value proposition is what Zero Friction is all about," he said. "Now that we have the technology customers need, we are enabling them to manage that technology themselves across their entire media organization. We now have an operational and business model that allows them to take advantage of this multi-functional architecture in a highly elastic way. Broadcasters now have the freedom to allocate their licenses not only where and when, but for whatever product they desire."

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