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# 21<sup>ST</sup> CENTURY TV OPERATIONS: READY FOR ANYTHING



INCREASING AGILITY USING VIRTUALIZATION AND ORCHESTRATION  
THE LONG ROAD TO CONVERGED VIDEO OPERATIONS  
THE IMPACT OF OPERATIONS TRANSFORMATION ON HR  
HYBRID OPERATING ENVIRONMENTS, WHERE SCALE MATTERS



Videonet gives platform operators, media groups and channel owners information and analysis that helps them transform themselves for the connected era. We are focused on the push towards any-screen TV, virtualized operations, data-driven advertising, programmatic trading, more HTTP streaming, immersive television and more personalized TV experiences, highlighting trends and best practice in an era of unprecedented disruption and new opportunities. We deliver our insights through a regular newsletter, special reports and webcasts.

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## COMMENT

Television used to be an island, an industry unlike any other with its own specialized equipment, unique processes and technology skillsets. But as television has become more IP-centric it has also become more IT-centric and we are beginning to see how TV operations can be converged with the wider world of IT, and how video headends and backoffice functions can be migrated into data centers and ‘the cloud’.

Virtualization of video headend functions has already started for multiscreen TV and is about to begin for ‘mainscreen’ television. Orchestration will become a crucial function in the ‘new’ television environment. Traditional media companies will need organizational changes. The way the vendor ecosystem works and the way the television industry approaches innovation could be changed forever.

In this report we look at the opportunities and the challenges associated with this new operations model. The main benefit is agility, giving broadcasters and service providers the ability to launch and update services more quickly but this is also about rationalization – like the ability to create common ‘headends’ and workflows for multiscreen and mainscreen services.

This is the ‘backoffice’ revolution to accompany the consumer-facing revolution we are already witnessing as broadcasters and platform operators go increasingly OTT and multiscreen. It should mean they are better prepared for a future where powerful new rivals, like Netflix and Amazon, want a bigger share of time and wallet.

**John Moulding, Editor, Videonet**



## CONTENTS

- **Increasing agility using virtualization and orchestration**

Agility is the No.1 motive driving the transformation in Pay TV operations. Cloud architectures help to exploit superior content as a service differentiator. Orchestration makes it easy to create new video workflows and consolidate separate video ‘production lines’.

- **The long road to converged video operations**

Virtualized software can now be used for broadcast-quality video delivery to mainscreen TVs, including for live, with orchestration platforms ensuring redundancy. On-demand could be unified using adaptive bitrate streaming as a precursor to everything, including linear TV, moving to ABR.

- **A hybrid future where scale matters**

There will be a mix of hardware, software and fully virtualized video processing and on-premise and off-premise activities in a multi-vendor environment. The cloud will be hybrid including VMware and OpenStack. Collaborative efforts and technology sharing will help create scale for TV innovation.



# INTRODUCTION:

By **Dr. Ken Morse**  
 CTO, SP Video Software  
 and Solutions, **Cisco Systems**



As we look back at the evolution of the PayTV architectures over the last two decades there have been a large number of key transitions; the move from analog to digital transmission; Video on-Demand; Digital Video Recording and High Definition to name but a few.

However, out of all of these transitions, the impact of virtualization on the PayTV industry will be the largest both from an architecture and business perspective.

The convergence of compute, network and storage with increasing performance and continually reducing costs has created an inflection point in the industry. Services that were traditionally too expensive to implement without dedicated hardware appliances can now be implemented on generic compute platforms and benefit from the service velocity that comes from developing on more open platforms.

Virtualization forms the backbone of cloud computing and enables the creation of pools of resources that can be dynamically allocated to tasks on demand as a PayTV operators' business needs evolve. That dynamic capability can be exploited both on a sub-second perspective, for example spinning up virtualized instances of transcoders based on consumer usage; through longer-term migrations such as standing up cloud-based User Experiences.

No component of the content creation and delivery chain will go untouched. Virtualization impacts content creation and preparation workflows through delivery and into the home as the availability of two-way, always-on network connections enables functions to be moved from the endpoint device back into the operator's network.

It is perhaps this last point that will cause the greatest subscriber impact. By moving away from the historical approach of "thick client software" set-tops to an environment that embraces features and business logic in the cloud, Service Providers will be able to join the ranks of the web giants in releasing new features to their

subscriber base in hours versus the traditional quarterly cadence experienced today.

This also revolutionizes how the product and marketing teams within PayTV operators work too. In the past, new service introduction required a fully validated and understood business case resulting in large development commitments to deliver over an extended period of time. In the new world, virtualized systems enable the operator to try new features rapidly, initially with a subset of subscribers, validate, improve and deploy far and wide.

Whilst service velocity is an important result of leveraging virtualization, perhaps the biggest impact may be felt in the operations revolution that it enables. Its power is opened up through the use of orchestration systems that provide the framework for managing the collection of virtualized services, and, perhaps equally importantly, the ability to interface and manage the existing deployed "dedicated-hardware" systems in use today. It is these orchestration systems that unleash the full power of virtualization, enabling new broadcast channels and workflows to be instantiated in minutes versus weeks as experienced today.

Orchestration systems, such as those used in Cisco's Virtualized Video Processing (V2P) environment, also enable the seamless integration of multi-vendor components to provide a video processing infrastructure that meets the demanding needs of the modern PayTV operator today and into the future.

One thing is clear, everything you thought you knew about the PayTV industry is about to change – better infrastructure economics, faster service velocity, seamless multi-vendor environments and an operations revolution which, when taken together, make this one of the most transitional and exciting times to be in the video industry. ■



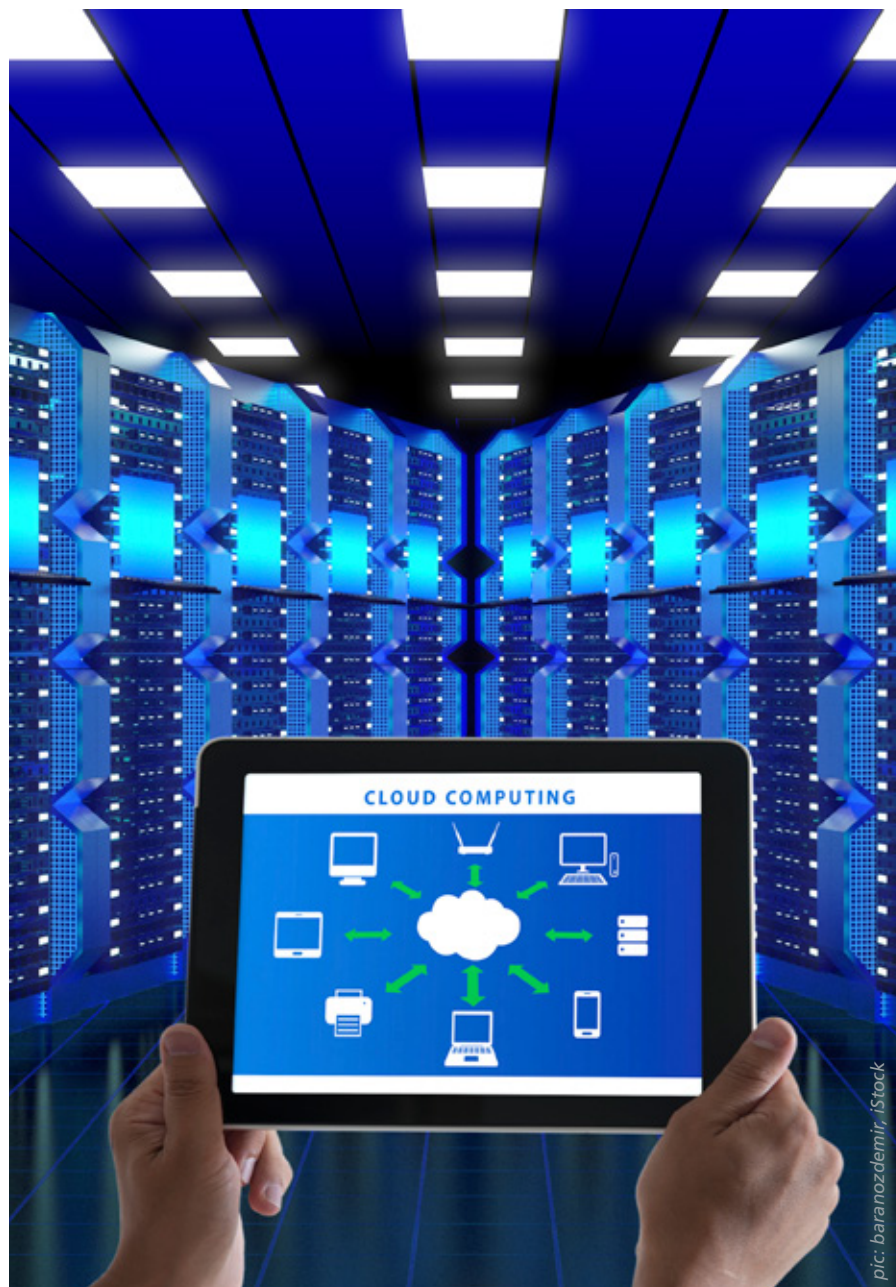
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# 21<sup>ST</sup> CENTURY TV OPERATIONS: READY FOR ANYTHING

**Traditional TV companies survived the OTT and multiscreen revolution but for a while they were playing catch-up with consumer expectations and new rival services. The lesson has been learnt and there is a quest to make operations more agile using virtualization and orchestration. John Moulding reports on how an operations transformation is underway.**




## INTRODUCTION

Traditional TV companies have defied predictions about their imminent demise by responding to new consumer demands for more multiscreen and on-demand viewing and, on a more limited scale, richer and more personalized user interfaces. They proved that they can remain relevant to the viewers and subscribers of tomorrow – the famed millennials and their successors, Generation Z. It has been enough to maintain investor confidence.

Despite increased competition, things are turning out okay, but it took an almighty effort – dozens of career-defining strategy plans and some notable examples of business and marketing transformation. It is about time it was made official: ‘traditional’ TV has survived the unprecedented disruption caused by OTT video and connected TV devices. A sobering lesson has been learnt, however, about how quickly you can be overtaken by events.

Take the Pay TV operators. In the early days of OTT, they were always catching up with early-adopting consumers who were restless for multiscreen access. Overnight, they went from being the innovators to the technology laggards and took years to cast off the label – a humbling experience. Their broadcast spectrum and expensive set-top boxes still mattered but their relative value was diminished once the world was fixated on CE devices and streaming video.

This partly explains the interest today in new operations and innovation models for television, whether it is collaborative efforts to update set-top boxes faster (like 



Dan Finch, Simplestream ▲

of the Internet era. Everyone worries about what would happen if they spent their billions on a serious push into TV.

It could be that OTT and multiscreen was just the first big battle to decide who consumers turn to for their fun. The next battle could be around the television set user experience, and then maybe the way entertainment blends with the Internet of Things. The truth is that nobody knows what the big value-add will be five years from now, which is why you have to be ready for anything.

As a result, we are about to witness a dramatic, albeit slow, trans-

virtualize network functions, such as Software Defined Networks (SDN) and Network Function Virtualization (NFV).

There will probably be more reliance on open-source initiatives that look to avoid duplication of effort. Multi-vendor cooperation will be important at all levels, whether it is making real-time IP studio networking realistic or giving customers best-of-breed software options within a virtualized data center environment. There will be a focus on scale to solve big problems or pursue big opportunities, demanding pragmatism. The declaration by Cisco and

## NOBODY KNOWS WHAT THE BIG VALUE-ADD WILL BE FIVE YEARS FROM NOW, WHICH IS WHY YOU HAVE TO BE READY FOR ANYTHING

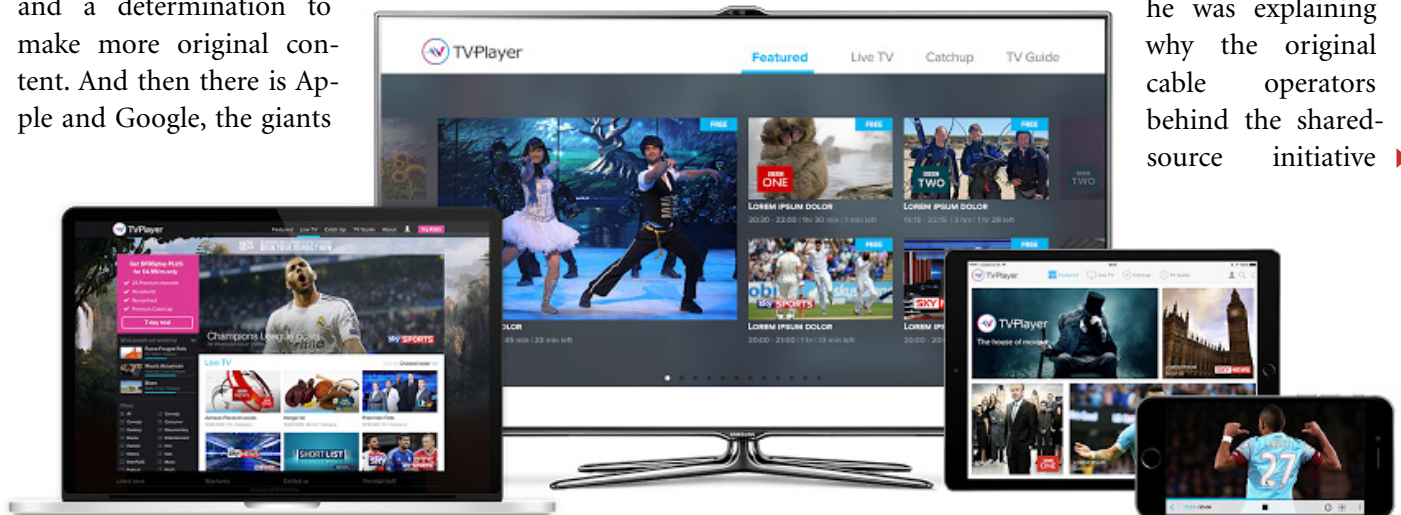
▶ with RDK) or efforts to virtualize video processing so it is easier to provision new services. The television industry as a whole, and Pay TV operators especially, are determined to become more adaptable on a permanent basis.

Everyone can see that the world has changed forever. Despite maintaining incumbent advantage, Pay TV operators have big new rivals who want a share of consumer time and money. The likes of Netflix and Amazon have their own large subscriber populations now, and a determination to make more original content. And then there is Apple and Google, the giants

formation of how television works as the industry harnesses IT concepts that OTT providers have already mastered, including virtualization and managed services. The future of television ‘headends’ and customer premise equipment will be interweaved with initiatives across the communications industry to

Ericsson that they will work more closely together to help service providers create the networks of the future is a good example. The marriage of AT&T and DIRECTV is another.

To understand what is happening, it is worth remembering the words of Steve Heeb, President and General Manager at RDK Management, in 2014 when he was explaining why the original cable operators behind the shared-source initiative ▶▶



The TVPlayer multiscreen service ▲



Cisco illustrates what the new operations environment looks like and its role within it ▲

## THE REASON PEOPLE TALK ABOUT AGILITY IS THAT THEY NEED TO IMPROVE THE TOP LINE. THEY HAVE TO INTRODUCE SERVICES MORE RAPIDLY

▶ decided to open it up to satellite and IPTV rivals. He said it needed worldwide scale. “Everyone needs to take a step back and ask who their real competition is. Today it is telcos and satellite but five years from now, and especially when everyone transitions to IP networking, it will be dramatically different.

“Amazon, Google and Apple want to be in the video business and these are the competitors on a worldwide basis. Opening up RDK was for the good of the many. On its own, the cable industry is not big enough to compete with those new competitors.”

## ● INCREASING AGILITY USING VIRTUALIZATION AND ORCHESTRATION

Factors driving the transformation in Pay TV operations include an effort to lower CapEx and OpEx, lower the risk for new service launches, reduce complexity and increase agility. For most companies, agility is the No.1 motive. In a survey of global service providers (sponsored by Amdocs), the market intelligence and advisory firm IDC concluded that increasing service velocity is now viewed as a

business-critical mission. This was rated first among the capabilities needed to survive in the digital age.

Andy Hicks, Research Director, Telecoms and Networking for EMEA at IDC, reckons a video service provider may be able to cut CapEx by 20-30% with a new operations model, “but that is just going to improve your balance sheet, not your business.” He adds: “The reason people talk about agility is that they need to improve the top line. They have to introduce services more rapidly, with a much lower opportunity cost.”

Simon Frost, Global Head of Media Marketing and Communications at Ericsson, stresses the “incredibly disruptive period that we are in” and how inaction is now a dangerous activity for any media company. He says one of the pillars of service provider transformation is ‘permanent innovation’ - the ability to deploy new services in hours and days, then easily change and upgrade them.

“The new entrants have organized themselves around cloud ▶▶



## IF NETFLIX IS THE POSTER BOY FOR 'BORN IN THE CLOUD' MEDIA COMPANIES AND THEIR AGILITY, COMCAST IS THE CLOUD CHEERLEADER FOR PAY TV

▶ technology and are focused on fast, consumer-facing innovation. Most of the [traditional media industry] is not built or organized in the same way," he adds.

Daniel Hesselbarth, Product Innovations TV & Broadband at Unitymedia Kabel (part of Liberty Global), has stated that, "We need operational transformation as an industry. We need to be faster to market and quicker to react to customer demand and to solve operations problems." Sky Deutschland has made it a publicly stated goal that it should bring something new to customers – big enough to warrant press coverage – every 4-6 weeks.

If Netflix is the poster boy for 'born in the cloud' media companies and their agility, Comcast is the cloud cheerleader for Pay TV. The company uses its own private cloud and 'platform as a service' environment, using

OpenStack, as the architecture behind its next-generation X1 platform. The resulting innovation, including a more personalized user interface and multiscreen access to personal recordings (using cloud DVR) has been credited with reducing churn and stabilizing the Pay TV base.

When Comcast launched X1 in 2012 the company called it a giant leap forward. "Essentially we are transforming our video product from a hardware experience to a software experience, allowing us to innovate faster and more aggressively."

Brett Sappington, Director of Research at Parks Associates, the market research and consulting firm, says customers of Pay TV operators who use virtualized operations (as Comcast does for a number of video functions) should notice more frequent additions of new features or regular improvements in the service



Brett Sappington, Parks Associates ▲

or its interface.

One of the things that Comcast achieved thanks to X1 was to present a huge content offer with better content discovery, including unified search and recommendations. And according to Gil Cruz, Architect for Video Software at Cisco, one of the greatest benefits of a cloud architecture in Pay TV is that it helps to exploit superior content as a service differentiator. This relates to the volume of content you can offer, where it is available and how easy it is to find.

"Pay TV operators have always had rich content libraries but the content was hidden behind archaic user interfaces. A next-generation UI combined with recommendation boosts consumption and monetization. We see customers with 50,000 or 120,000 on-demand assets. There are not many people out there that can compete with that but it needs to be available everywhere. You may need to process all your assets 12 different times according to target device and network technology. That ▶▶



The TV industry is becoming more IP and IT-centric ▲

pic: kynny, iStock



Video headend functions can migrate into servers ▲

about their plans but Globo, the free-to-air TV broadcaster in Brazil and one of the largest content producers worldwide, views the virtualization and orchestration of network functions and workflows as a way to increase business agility. Last November the company launched Globo Play, a multiscreen offer with VOD and simulcasting and it has been implementing a unified infrastructure to support and streamline different video workflows, reducing complexity and cost.

This project highlights how television operations are starting to converge with IT. The broadcaster is using content management technologies that will be familiar to many multiscreen operations teams, but also a virtualization and orchestration platform from Cisco called V2P (Virtualized Video Processing) that abstracts video processing software from dedicated hardware appliances and moves them into data centers. Globo is also using Cisco Unified Computing System (UCS) servers and Cisco Nexus switches as part of the deployment.

Sappington agrees that multiscreen is the biggest driver towards ►►

## ONE OF THE GREATEST BENEFITS OF A CLOUD ARCHITECTURE IN PAY TV IS THAT IT HELPS TO EXPLOIT SUPERIOR CONTENT AS A SERVICE DIFFERENTIATOR

►► requires that you can scale your operations efficiently.”

Cruz reckons multiscreen viewing is therefore the biggest driver behind the trend towards virtualized video processing and the orchestration that goes with it.

The evidence from the field tends to confirm this. In one example, Sky in the UK has virtualized the transcoding for the on-demand content it makes available on Sky Go and NOW TV and is currently re-engineering its operations for software-based, virtualized transcoding of its linear content for the same services, using Elemental Technologies software. Last year, Matt McDonald, then Director of Broadcast Services for Sky in the UK and now CTO at Sky Deutschland, declared that, “We need an architecture that is fast and

responsive in this very dynamic OTT world.”

Broadcasters face a similar challenge. Few have talked publicly



Video operations can share data center infrastructure with other functions ▲ pic: Cisco



## 21ST CENTURY TV OPERATIONS

▶ virtualization, but not the only one. “On-demand consumption is also important. On-demand services began to push operators to deliver video in a different way, but it was multiscreen video that really forced the issue,” he recalls.

V2P represents a completely new kind of television technol-

orchestration platform knows exactly what resources are available at any given moment, where they are, what jobs are already running on them and where future tasks can be assigned. For management purposes, all the different instances of a resource are treated as a single, common asset.

If you are virtualizing video

with increasingly advanced features on the newer ones. One example is only handing jobs to servers with advanced data security.

Enhanced Platform Awareness (EPA) in OpenStack enables deployment of virtual machines (VM) onto server platforms with the specific hardware and silicon capabilities that are optimal for the particular needs of the VM. Despite their apparently generic nature, some server systems can contain specialized silicon and application-specific accelerators designed for different types of workload.

Cisco points out that using the traditional operations model, each screen and form of video requires a separate video production line, using optimized hardware, hard-wired together, often with proprietary interfaces. They often contain the same core functions, like encoding or recording. A product like V2P helps improve Pay TV agility because these separate production lines can be consolidated.

As Gaurav Rishi, Director, ▶

### “ON-DEMAND BEGAN TO PUSH OPERATORS TO DELIVER VIDEO IN A DIFFERENT WAY, BUT IT WAS MULTISCREEN VIDEO THAT REALLY FORCED THE ISSUE”

ogy, a management platform for matching software applications to the most suitable compute, storage and network hardware resources. These resources can include dedicated hardware appliances in a traditional headend rack, designed and optimized to run specific software, and generic servers in a data center (on-premise or off-premise). The

processes to a data center, you need to do more than randomly assign a task to any of the servers present. One of the important capabilities in OpenStack, the open-source orchestration operating system, is the ability to recognize and take advantage of specific platform features in a data center where there could be multiple generations of servers,



The XFINITY TV app from Comcast ▲





Klas Ahlin, Magine ▲

## YOU AVOID EQUIPMENT-SPRAWL AND PROBLEMS OF MANAGEABILITY, AND YOU IMPROVE TIME-TO-MARKET

start ‘service-chaining’. Cisco cites a recent deployment where a customer used existing general purpose compute and storage infrastructure to ‘stand-up’ 12 linear channels, then test one of the channels with encryption before encrypting them all without any site visits. Live-to-VOD processing was then added simply by switching on some software, all using the orchestration platform. “No new hardware or specialist appliances were required,” Gil Cruz points out. “This is a game-changer.”

Other traditional headend vendors, like Harmonic and Ericsson, have their own orchestration and virtualization platforms and this looks like a new competitive battleground for vendors. Tom Lattie, VP Market Management & Development, Video Products at Harmonic, says: “We are seeing content and service providers transitioning to virtualized infrastructure to re-architect their workflows and combine previously discreet media processing stages.”

Among its customers, Harmonic has seen a focus on uniting the play-out and encoding stages to simplify workflows.

Headend vendors will continue to compete on the basis of ‘point-solutions’, meaning individual functions like encoding or statistical multiplexing. At the same time everyone is going to have to cooperate to ensure their function-software can be integrated into different orchestration solutions. This could place an emphasis on the ‘openness’ of any virtualization and orchestration platform and their APIs. Service providers will want the ability to cherry-pick ‘best-of-breed’ software and integrate their own software into this environment.

Matt Smith, Chief Evangelist at Anvato, which provides a multi-screen solution for automating live video capture, editing, publishing and syndication, explains how this new approach to video operations could affect the vendor ecosystem.

Media companies could use Anvato for live-to-VOD requirements, including clip-creation for instant availability via social media. The ▶▶

▶▶ Product Management and Business Development at Cisco, explains, you can stitch together the functions needed to create service use-cases. If you are dealing with fully virtualized functions, each function is a software application running on some generic hardware. Creating a new video workflow is as simple as selecting options in the V2P orchestration interface. “You avoid the need to ‘stand-up’ the new services. You avoid equipment-sprawl and problems of manageability, and you improve time-to-market,” he says. “This approach tackles the heart of the problem.”

Rather than ‘device-chaining’ you



Comcast has used its cloud-centric X1 platform to accelerate innovation ▲

## 21ST CENTURY TV OPERATIONS

▶▶ company's software can be run on appliances or virtualized on COTS (common off the shelf) servers.

"More people are asking to take our software stack to run on a server," Smith reveals. "We are currently working to be integrated with orchestration platforms. It is a way to hook into cable and broadcast infrastructure and provide a seamless OTT capability, running our software on their choice of hardware. For us it is way to grow our business. We do OTT and we do it well. We think this model will emphasize a best-of-breed approach."

Rishi reckons the new operations paradigm favours 'transformation partners' who understand the virtualized ecosystem, who provide more than point-solutions, who can work across all the different functions and who do not force any particular software upon the service provider or content provider.

## THE LONG ROAD TO CONVERGED VIDEO OPERATIONS

While Netflix and Amazon make most of the headlines when it comes to OTT, there are other 'born in the cloud' service providers who demonstrate what can be achieved with a next-generation operations model. Magine TV is one, the Stockholm-based OTT/multiscreen service provider that operates in Sweden and Germany as a virtual television platform, with a multichannel line-up of linear streaming channels and on-demand content.

The company built its managed and cloud-based OTT operations from scratch including all service provisioning logic, complete with a workflow system that keeps

### WHAT IS VIRTUALIZATION OF VIDEO PROCESSING?

Virtualization is where you abstract the software needed to perform video processing tasks, like encoding, transcoding or storage, from dedicated hardware that was optimized specifically for that purpose. It has been made possible because generic compute platforms, like the servers found in data centers, have become so powerful. Virtualization enables hardware to be shared by different functions, maximizing its usage.

Although cost reduction is not the main reason for the transformation to a more IT-centric operating model, it does feature in the background. In the broadcasting industry it is generally accepted that a migration to enterprise servers and switches will reduce the reliance on video-specific systems that are relatively expensive, given that video remains a sub-segment of a bigger networking and communications marketplace. Virtualization also means you can share fixed infrastructure costs (like buildings and security).

When combined with cloud services, virtualization provides 'elasticity', too. It gives media companies the ability to 'spin-up' extra hardware resources at very short notice when needed.

Many of the traditional headend and playout functions can now be virtualized (and therefore orchestrated) including capture and ingest, encoding, packaging, graphics, playout advertising and content security. Brett Sappington, Director of Research at the analyst firm Parks Associates, gives his view on the ambitions that are driving the trend to virtualized TV operations. "Agility is certainly an important element of virtualization but other issues are important.

"With virtualization, operators can use only what they need of particular functions. So, rather than buy infrastructure systems to deal with peak traffic, they can rely on their internal systems for the most cost-efficient load and then rely on cloud-based systems to handle peaks. In this way, the operator does not have systems sitting idle, waiting for that next big spike in traffic. So virtualization helps operators to spend capital more efficiently. Cost reduction is also an issue."

According Gaurav Rishi, Director, Product Management and Business Development at Cisco, "We are definitely seeing a shift from [dedicated] hardware to a software-based model. "Most of our service provider and content provider customers are saying that they do not want to buy more specialist hardware. They want to achieve economies of scale by re-using compute or storage capacity [on generic hardware] for different applications." ●

track of available hardware resources for transcoding (performed at its own sites around the world) and other backend services (hosted by cloud providers like Amazon Web Services). This workflow system also

provides an oversight of all services that are running across the platform. The platform provides redundancy on a data center level.

Magine can ingest media content across the globe and then deliver ▶▶



## 21ST CENTURY TV OPERATIONS

▶▶ it anywhere else. Klas Ahlin, Head of Service Operations at Magine, highlights the extent to which this next-generation operations paradigm supports innovation and expansion. “We can set up new data centers for either transcoding or backend services in just days. As such, it is a very rapid process for us when entering a new country or regional market that requires incorporation of local broadcast channels.

“Since we can always choose to provision our service either through physical data centers or completely via cloud operators, we always have a choice when adding new content to our service. This means that time-to-market is very short. The cloud makes it easy to expand services fast, and allows for the easy implementation of TV services all around the world.”

The UK company Simplestream also provides a consumer-facing OTT service in the form of TVPlayer (the virtual platform with free-to-air and pay linear channels



Virtualization into data centers requires an orchestration management layer ▲

“WE CAN SET UP NEW DATA CENTERS FOR EITHER TRANSCODING OR BACKEND SERVICES IN JUST DAYS”

and a growing line-up of on-demand content) and platform services to channels that want to be in the streaming market, reaching connected devices. The company still uses on-premise, appliance-based encoding but has just migrated from its own NAS storage system to a cloud model for its live-to-VOD processing. This turns linear feeds into on-demand assets.

As Dan Finch, Commercial Director at Simplestream and TVPlayer explains: “We needed more and more content and it was taking lots of space in the data center. We are now using Amazon and that has streamlined the workflow.”

The company has a dedicated pipe between its data center and Amazon Web Services in Ireland that provides instant file delivery from the on-premise encoders. Channel

partners have complete control over the content in AWS using the Simplestream Media Manager software.

“The cloud is helping to shape the future of broadcast,” Finch declares. When channel owners use the Simplestream SaaS to take care of their streaming requirements they can avoid building large operations teams and Finch believes the SaaS model starts to level the playing field between smaller and larger media companies. “This approach, using the cloud, gives much smaller broadcasters the kind of ‘bells and whistles’ that larger companies have.”

Finch thinks a more cloud-centric operations approach will also level the playing field when it comes to agility, enabling traditional broadcasters to innovate as quickly as companies like Netflix and Amazon.

There is a growing belief that ▶▶



Tom Lattie, Harmonic ▲





Magine TV is expanding worldwide thanks to cloud technologies ▲

## REDUNDANCY IS A BIG DEAL, ESPECIALLY IF YOU WANT SYSTEMS FOR PRIMETIME MAINSCREEN TV

► software-based video processing, which underpins virtualization and cloud-centric operations, is ready for primetime. Sam Blackman, Chief Executive Officer and Co-founder

at Elemental Technologies, believes we have passed the inflection point on the road to software-based video processing. “We are at the start of the curve when software takes over

completely,” he argues.

Speaking last summer, days after it was announced that his company was being acquired by Ericsson, Julien Signès, President and CEO at Envivio, also claimed the industry had reached a turning point. “All the big European platform operators are starting to have RFPs [Request for Proposals] for software-based virtualized solutions,” he told Videonet.

Yvette Kanouff, Senior Vice President/General Manager, Service Provider Business, at Cisco, agrees it is now possible to use virtualized software for broadcast-quality video delivery to mainscreen TVs. This means for live TV, not just on-demand. Last year her company unveiled virtual DCM, a virtualized headend solution that provides the same encoding, transcoding and multiplexing performance as the traditional hardware-based DCM. The virtualized version maintains the same broadcast dependability thanks to redundancy and failover mechanisms.

Redundancy is a big deal, especially if you want systems for ►



The advertisement features a man in a blue shirt holding a tablet displaying a soccer game. The background is a mix of purple and red. The text includes the nc+GO logo, a promotional offer, and contact information.

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nc+ advertises its nc+GO multiscreen service ▲





Simon Frost, Ericsson ▲

## IF YOU CAN VIRTUALIZE MAINSCREEN TV OPERATIONS IT BECOMES FEASIBLE TO UNIFY STB AND MULTISCREEN SERVICES, AND LINEAR AND ON-DEMAND

▶ primetime mainscreen TV. Thomson Video Networks, now part of Harmonic, provided a nice demonstration of how it can work at IBC last year. The orchestration layer automatically looks for alternative virtual machines (running on servers in private data centers) if the virtual machine you are currently using for encoding or transcoding fails.

As all processors are not equal, you need to know the performance and capacity of each ‘instance’. You also need the ability to load-balance the jobs and understand what is running on each virtual machine, and so avoid overloading them. Ludovic Pertuisel, now Product Manager at Harmonic, pointed out: “When a customer comes to us the first thing they ask about is quality, and then redundancy.”

If you can virtualize mainscreen TV operations it becomes feasible to unify STB and multiscreen services, and linear and on-demand.

Sappington at Parks Associates thinks we could eventually see standard TV and multiscreen TV converged into a common workflow, perhaps sharing the same virtualized resources in a data center. “IPTV providers

will arrive at this point well ahead of most cable operators,” he predicts.

Today, some operators have a single headend for their traditional on-demand delivery (perhaps covering catch-up, start-over and even nDVR) and a parallel multiscreen system for unicast adaptive bit-rate (ABR) on-demand services. Various commentators expect on-demand to be unified using ABR and some think this is a precursor to everything, including linear TV, moving to ABR in the longer-term.

Gil Cruz predicts that during the next five years our attitudes will ‘flip’ and the industry will think of ABR (and so IP) as the defacto delivery solution and broadcast systems as a legacy, albeit hugely important, edge distribution mechanism. In turn, this will focus industry attention on multicast ABR streaming in order to cope with large-scale television events where there is high concurrency. Broadpeak, which provides operator CDN solutions, addresses this need with its pioneering nanoCDN technology and Akamai has listed multicasting as one of its ▶▶



The Imagine TV operations center ▲



## 21ST CENTURY TV OPERATIONS

▶▶ development pillars for the Internet of the future.

One company with a roadmap to a more unified and virtualized operations environment is nc+, the Polish Pay TV operator. The company has introduced an orchestration platform (the Cisco V2P) at the heart of a next-generation 'headend' solution for multiscreen TV, covering live, VOD and time-shift TV, with the capability to support cloud DVR in future. V2P takes care of the live encoding, on-demand transcoding, recording, storage, packaging and playback for the multiscreen services. nc+ hopes to dramatically simplify its video operations with the new architecture.

The system has been architected to cater for a hybrid environment covering hardware appliances and virtualized video processing. The software and virtualized components for the new headend are implemented on Cisco data center technologies including Cisco UCS servers and Cisco Catalyst C4500-X switches. UCS is a data center platform that unites compute, network, storage access and virtualization into a cohesive system.

When announcing the deployment, Yves Padrines, Vice President, Global Service Provider at Cisco EMEAR declared: "nc+ shares our vision for the future of television and recognizes the need to unify their network architecture, combining physical and virtual resources to provide the cost savings and agility they need."

## A HYBRID FUTURE WHERE SCALE MATTERS

So what will the future operations

### THE IMPACT OF OPERATIONS TRANSFORMATION ON HR

There are mixed messages about the impact on human resources when moving to a more IT-centric operations model for television. There have been suggestions that IT/IP engineers are easier to find and hire but the majority view is that there could be a skills gap or at least significant organizational challenges.

In a recent survey, the market intelligence and advisory firm IDC asked service providers what would most help them transform into digital service providers. "Having the right skills to create and implement digital transformation strategies were ranked first and second," the analyst firm reported.

Andy Hicks, Research Director, Telecoms and Networking for EMEA at IDC, reports that HR executives familiar with TV service providers say it is hard to find people with modern IT knowledge and all the traditional networking skills that they still need. "There are only a handful of those people so you have to solve the issue by putting together teams the right way, and by making sure you have people communicating properly."

Tom Lattie, VP Market Management & Development, Video Products at Harmonic, which provides traditional and virtualized video headend and playout solutions, also highlights an organizational challenge. "The shift to virtualization provides content and service providers with a very powerful architecture but it does require a complete rethink about how workflows should be designed and deployed.

"Migrating to a virtualized offering can impact technology as well as the organization, since service providers can combine functionalities that were previously managed by separate teams of people," Lattie explains. "This transition will require significant retraining and augmentation of existing staff."

Gil Cruz, Architect for Video Software at Cisco, says staff poaching is already a problem. "Some of our customers have built pools of expertise in certain areas and then had it taken by companies who are not even service providers. You are now competing with the whole virtualization market, whether it is for healthcare or retail or another function. This is a definite concern for some operators."

Cisco reports that previously separate video groups and IT groups with different organizational structures are now blending and working together at some Pay TV operators. IDC says its research points to service providers using professional services to bridge some of the skills gaps. ●

environment look like, beyond virtualization, orchestration and increasingly unified workflows? For a long time it will be hybrid, in many different ways. There will be a mix of hardware, software (on generic rather than video-optimized appliance

devices) and fully virtualized video processing. There will also be a mix of on-premise and off-premise activities, sometimes within the same company.

VOO, the Belgian cable operator, illustrates how flexible the ▶▶

## 21ST CENTURY TV OPERATIONS

► deployment options are. The company built an on-premise multiscreen headend for its VOOmotion TV Everywhere offer and uses the same headend for the transcoding and packaging of its linear Be tv channels. The rest of the Be tv Go multiscreen service (including non-linear content requirements) is hosted in the cloud.

SaaS models may appeal to service providers who need a short-time-to-market for a new service launch, or who need to scale beyond what their first-generation platform can handle, or who maybe want to launch internationally. Some operators will use SaaS to get started with their operations transformation because initially they do not have the skillset needed to do it alone. They could take back control of their video workflows later, if they want, after building up the necessary capabilities in-house.

There will also be hybrid cloud environments, with VMware, OpenStack and container-based implementations. OpenStack is an open-source software suite for creating private and public clouds and providing orchestration services within a Network Function Virtualization (NFV) environment. It is sometimes referred to as a cloud operating system, or even a Virtualized Infrastructure Manager (VIM). This solution has some influential supporters.

Virtualization in television should be viewed in the context of the shift towards SDN (Software Defined Networking) and NFV. In a 2015 paper sponsored by AT&T, Frost & Sullivan described SDN as a technology architecture that decouples the network control from the forwarding functions of the physical infrastructure. “SDN technology does for network services what virtual machines (VM) do for servers - it enables physical network resources



to be pooled together and consumed on-demand.”

Network Function Virtualization is a related network architecture that proposes virtualization technology to networks, the paper adds. “The aim of NFV is to replace the multitude of proprietary network elements [like hardware-based switches and routers] with industry standard, centrally managed commodity-based servers. In the network, NFV allows routers, switches... content delivery systems, end-user devices...[etc.] and almost

this case relating to bandwidth) and much faster provisioning of network resources.

SDN and NFV are spawning lots of collaborative efforts. ETSI is home to the Industry Specification Group for NFV (ISG NFV), whose aim is to create a diverse global com-

### SOME OPERATORS WILL USE SaaS TO GET STARTED WITH THEIR OPERATIONS TRANSFORMATION BECAUSE INITIALLY THEY DO NOT HAVE THE SKILLSET NEEDED TO DO IT ALONE

any other network function to be run as software on virtual machines and ultimately on shared servers using shared storage.”

Frost & Sullivan attributes a number of benefits to NFV that mirror what is hoped for from headend virtualization and orchestration. These include reduced operational complexity, lower total cost of ownership, real-time scalability (in

munity that pools its skills and experience and encourage the growth of an open ecosystem for NFV. CableLabs has been a long-term supporter of this initiative and in January hosted the ISG NFV in Colorado for a workshop with leading standards organizations and open-source communities – the first time these different groupings have met.

CableLabs itself has a number ►►





## 21ST CENTURY TV OPERATIONS

▶ of SDN and virtualization R&D projects in progress on behalf of cable operators, including work on virtualizing the Converged Cable Access Platform (CCAP) and customer premises equipment (CPE). Chris Donley, Director, Virtualization and

of the network function code that drives 80% of the value.”

This is the same kind of logic that prompted the launch of RDK, which grew from the need to increase the speed of STB software innovation, gaining the economies of scale that

down to the SoC level but it does not cover the applications and UI, which is where users and vendors differentiate and generate revenue. Thanks to RDK, new set-top boxes take a few months to get into the field instead of 18 months and prototype apps are available in days rather than months. As with virtualization and the wider SDN/NFV marketplace, RDK is not just about service velocity but can also lead to cost reduction.

Like DOCSIS before it, RDK is helping the cable industry – and potentially the wider Pay TV industry – to achieve a scale that would not be possible if platform operators work in isolation. Scale is also being achieved by horizontal consolidation. One development that could turn into a trend is for a Pay TV operator to license its technology platform to other operators (which are not part of the same group).

Comcast has licensed its X1 platform to two cable operators: Cox in the U.S. and Shaw Communications in Canada. These service providers are licensing the underlying ▶

### THANKS TO RDK, NEW SET-TOP BOXES TAKE A FEW MONTHS TO GET INTO THE FIELD INSTEAD OF 18 MONTHS AND PROTOTYPE APPS ARE AVAILABLE IN DAYS RATHER THAN MONTHS

Network Evolution at CableLabs, recently told OpenDaylight, an interoperability initiative to encourage open SDN, why he values open-source.

“We can share the cost, to the benefit of everyone in the end. For instance, 80% of the controller code delivers 20% of the value. In this environment, it makes sense for the community to jointly develop the common platform so that companies can focus their time on the 20%

standards give you without having to develop new ones. RDK is modeled on open-source programmes like Linux but but was called shared-source because some of the software used was not available as open-source and had to be written. As with open-source initiatives, RDK code contributions are visible to all members of the community, subjecting the code to reviews and modification.

The RDK software (best understood as middleware) is integrated



Sky has made Pay TV truly screen-agnostic with its Sky Q platform ▲



**“A COMPANY THAT DOES NOT HAVE VIRTUALIZATION AND ORCHESTRATION IS AT A POTENTIAL COMPETITIVE DISADVANTAGE TO THOSE THAT DO”**

▶▶ technology and platform and can then determine how they use it, like which specific products they roll-out. As an example, Cox is using X1 for its Contour offer, which combines a powerful whole-home DVR with visually rich UI and STB apps, among other things.

The way the deals work, Comcast is effectively syndicating the X1 platform as a product. For Comcast, this is less about the financials and more about encouraging platforms and technologies that can span the industry. The company thinks the technology behind X1 affirms the competitive nature of the cable industry and demonstrates its broad value. There is a sentiment within Comcast that maybe X1 shows a way forward for the broader industry, and many commentators will agree with them.



Gaurav Rishi, Cisco ▲

Comcast is already talking with other cable operators, although no new deals are imminent. At Connected TV World Summit in March, Emma Lloyd, Director of Corporate Development, Partnerships and Investments at Sky, said licensing the new Sky Q next-generation platform to other operators who are geographically non-competitive is something it could consider in future. It was not something the Pay TV operator had originally considered, she said, but is a discussion that could be prompted by interest in the market since Sky Q was launched. There are no specific plans for this at the moment.

**CONCLUSION**

There is no question that we are in a new phase of TV transformation now, less visible to consumers but possibly just as important as the multiscreen apps and on-demand services. The focus is on making infrastructure permanently adaptable, able to respond quickly to new threats and opportunities. Sappington at Parks Associates thinks the migration towards more IT-centric operations could be slow, primarily because traditional Pay TV infrastructure systems are not broken.

“Companies like Netflix and Google have grown up in the era of the cloud. For Pay TV it is not as easy as simply starting over with a new architecture. They face a difficult task of re-orienting their current systems over time into an approach that can remain competitive in the long-run.”



Andy Hicks, IDC ▲

Despite this, Gil Cruz believes there is a growing momentum for change.

Hicks at IDC emphasizes that virtualization does not equal digital transformation, although it will support it. One major service provider, which is investigating a medium-term migration to a virtualized data center model for television, told us that the technical side of these projects is only half the job, the other half being organizational.

Sappington warns that adopting new operations models will be hardest for small and medium operators. He does not think they will be able to keep up with the majors and that this will prove to be a game-changer over time. “A company that does not have virtualization and orchestration of its video operations is at a potential competitive disadvantage to those that do,” Sappington reckons.

“Companies that have virtualized elements of their operations and have adequate orchestration of those virtual elements will have a much greater ability to adapt quickly to a changing marketplace.” ■

