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The case for M&E cloud

Moving to fourth-generation broadcast infrastructure

Media supply chain transformation series

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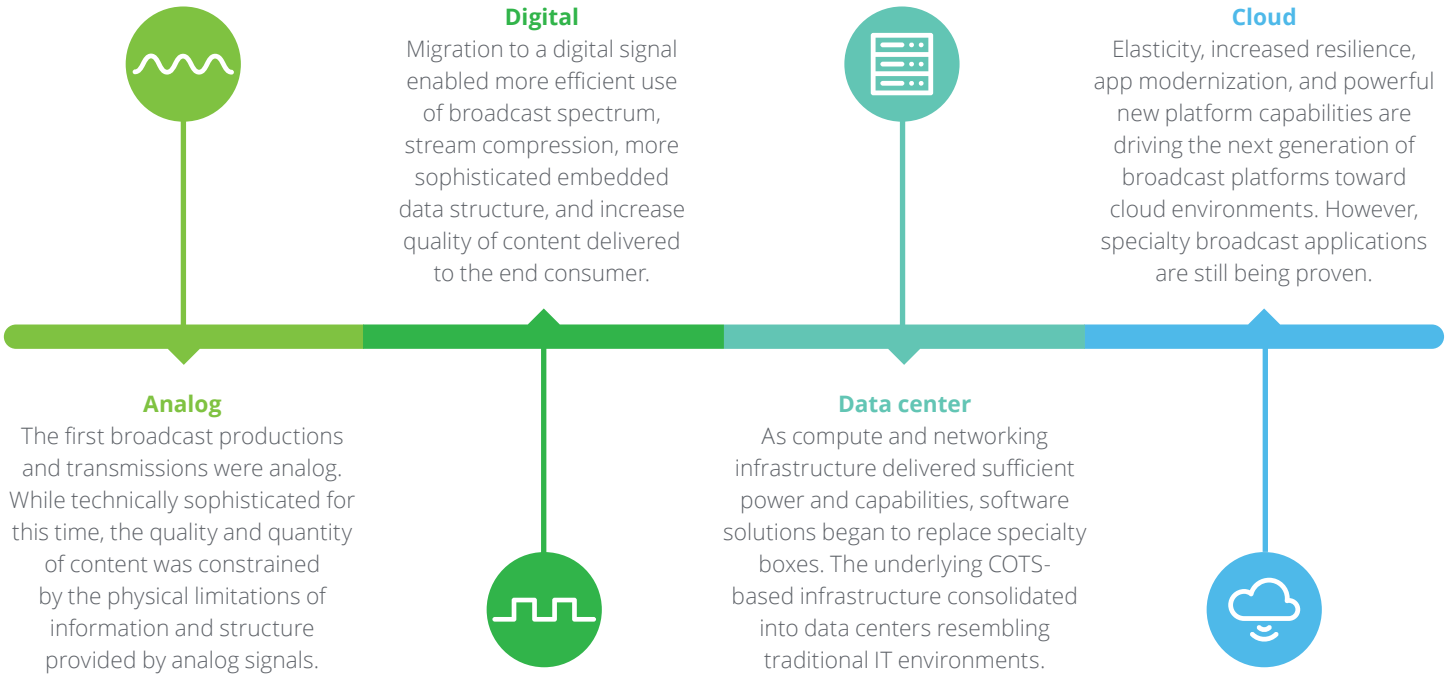
Introduction

After years of resistance, the media and entertainment (M&E) industry's acceptance of cloud-based media operations has reached a tipping point, spurred by digital technology advances, changing consumer preferences, and coronavirus pandemic–accelerated business imperatives. Prior to COVID-19, the M&E industry made progress addressing many of its long-held criticisms of cloud platforms by advancing the cloud-capable migration of core broadcast, postproduction, media management, and distribution technologies. However, when the pandemic required M&E companies to produce and distribute programming remotely, it also increased industry incentives to set aside lingering objections around cost, control, and security and embrace cloud media operations as a business necessity.

Almost overnight, broadcasters' successes with remote production and cloud-based video distribution tipped the industry off the indecision fence, making a return to precloud "business as usual" highly unlikely.

This paper reviews drivers of M&E cloud technology, highlights how cloud and everything-as-a-service (XaaS) models have overcome industry adoption challenges and provides directional guidance and considerations for M&E companies as they embark on the journey to fourth-generation broadcast infrastructure (figure 1).

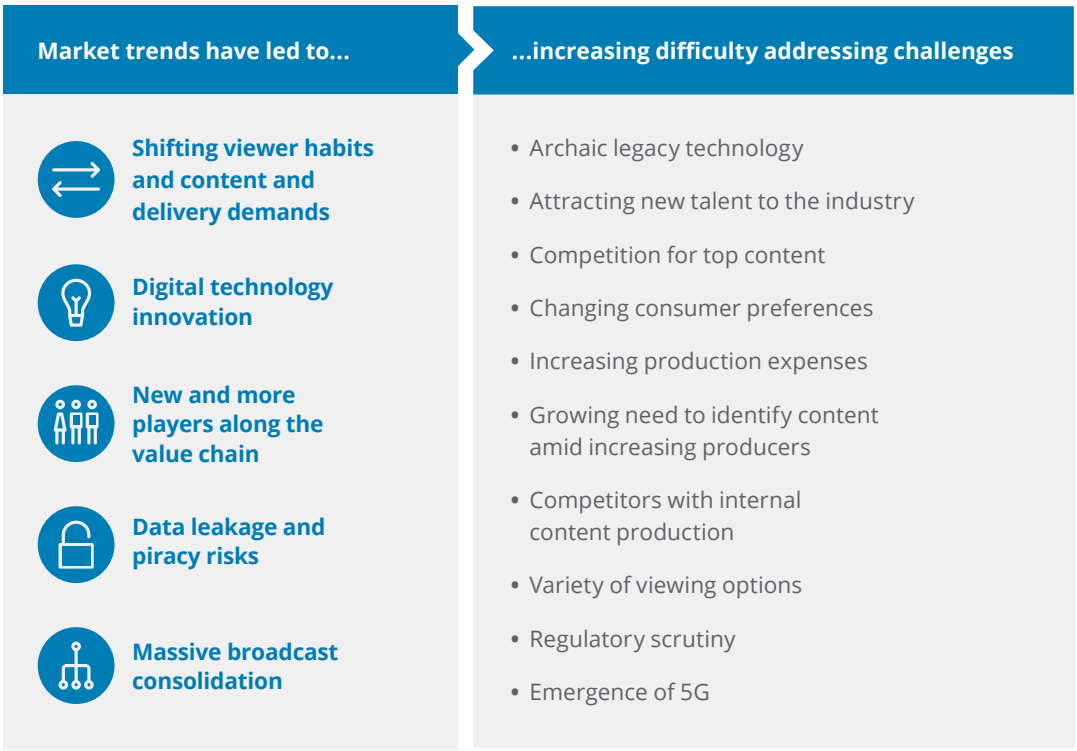
Figure 1. Broadcast infrastructure generations



The disruptive, dynamic M&E market

Shifting consumer viewing habits, new content and delivery demands, digital technology innovations, increasing competition, and COVID-19–related complexities are among the trends disrupting the already dynamic M&E market (figure 2).

Figure 2. M&E market dynamics



Evolving consumer choices

Dramatic changes in the ways people discover, consume, and share media content are reshaping the future of M&E. Today's consumers have more options than ever to access the fresh and broad content libraries they crave. Since targeted viewers for specific content are not consistently in one place—people are watching TV from more sources than ever before[1]—M&E companies competing for market share need to be able to seamlessly deliver content across a wide range of options and formats. They also need to make sure that the distributors to whom they license or sell content can put it in front of as many people as possible.

"In the future, industry leaders will be those who have optimized digital operating models, data-driven decision-making, and integrated intelligent workflows."

Graham Allan, managing director, Deloitte Consulting LLP

Consumers in April 2020 used an average of 4.8 video sources, compared with 3.7 sources in 2019. These sources include traditional pay TV, streaming platforms, and over-the-air with antennae.[2] Deloitte's *Digital Media Trends Survey, 14th edition* found that US households have an average of seven digital devices with screens, among them smartphones, tablets, smart TVs, and laptops.

Emerging business models

Video streaming is a hot market both for media companies and nontraditional content creators—and COVID-19 has caused market demand to explode beyond expectations. In difficult times, many people turn to the comfort, even escapism, of movies, TV, and gaming.[3] Today's customers have more time to watch, listen, and play games, and they are adding services to access new content. Social viewing, livestreaming, and first-run movies that release directly to digital services have shown strong engagement under shelter-in-place guidelines.

As consumer demand for content and delivery options increases, new market entrants are accelerating their use of direct-to-consumer (D2C) models, such as subscription-based, over-the-top (OTT) streaming, to reach consumers faster and deploy innovative monetization tactics. There currently are more than 300 streaming video services in the United States,[4] including newly launched Apple TV+,[5] Disney+, Comcast NBCU's Peacock, and WarnerMedia's HBO Max. And paid streaming video, music, and gaming subscription numbers are on the rise. Deloitte found that, this year alone, 23% of consumers have added at least one new service—80% of US consumers now subscribe to at least one paid streaming video service, raising the household average to four paid subscriptions.[6]

Growing revenue threats

Although media consumption is growing, grabbing and holding viewer attention is becoming increasingly difficult. For example traditional broadcasters are seeing advertising dollars decrease due to fragmented audiences and multiple viewing options that allow viewers to skip advertisements. In parallel, growing numbers of subscription-based services offer compelling content to compete for viewer eyeballs and time. However, growing revenue is not as easy for subscription services either. In the first half of 2020, 9% of consumers have both added and canceled at least one new paid streaming video service, suggesting more churn as consumers seek value.[7]

Remote workforce challenges

COVID-19 is shrinking global GDP, increasing unemployment, and increasing the cost-sensitivity of traditional media companies. In addition, M&E companies[8] are grappling with the challenges of managing a remote workforce, which many execs expect to be the norm for the next year or so.[9] More generally across business enterprises, research and advisory company Gartner found that 82% of business leaders say their organizations plan to let employees continue to work from home at least some of the time, while 47% plan to allow employees to do so permanently.[10]

"The COVID-19 pandemic has put the world into survival mode," notes *Analytics Insight* in a July 9 editorial. Businesses that have been reluctant to accept technologies such as cloud computing or unconventional work likely will have to revamp their thinking if they want to survive, especially as the COVID-19 pandemic continues to spur remote working. Subsegments such as public cloud services are expected to grow 19% in 2020. Cloud-based telephony and messaging and cloud-based conferencing also are likely to see high levels of spending, growing 8.9% and 24.3%, respectively.[11] CIO investments will be "minimized and prioritized on operations that keep the business running," explains Gartner's Research Vice President John-David Lovelock.

Growing investment needs

M&E companies are continually challenged to employ seamless and managed workflows for content continuity, visibility, and licensing across their expansive ecosystem. To remain ahead of the competition, companies will need to transition to flexible and scalable enterprise platforms to unlock trapped value and cost efficiencies. In addition, they should move away from legacy silos, inefficient workflows, and a "must build here" mentality. This transformation will require extensive investments in new technology capabilities and services. How can organizations meet growing technology investment needs in today's era of cost-sensitivity?

Cloud and XaaS: An affordable, flexible solution

The combination of cloud-based computing platforms and XaaS models offers M&E companies an affordable solution to their technology investment dilemma.

Already, forward-thinking M&E companies are leveraging cloud and XaaS technologies; those that aren't should consider doing the same or risk being left behind.

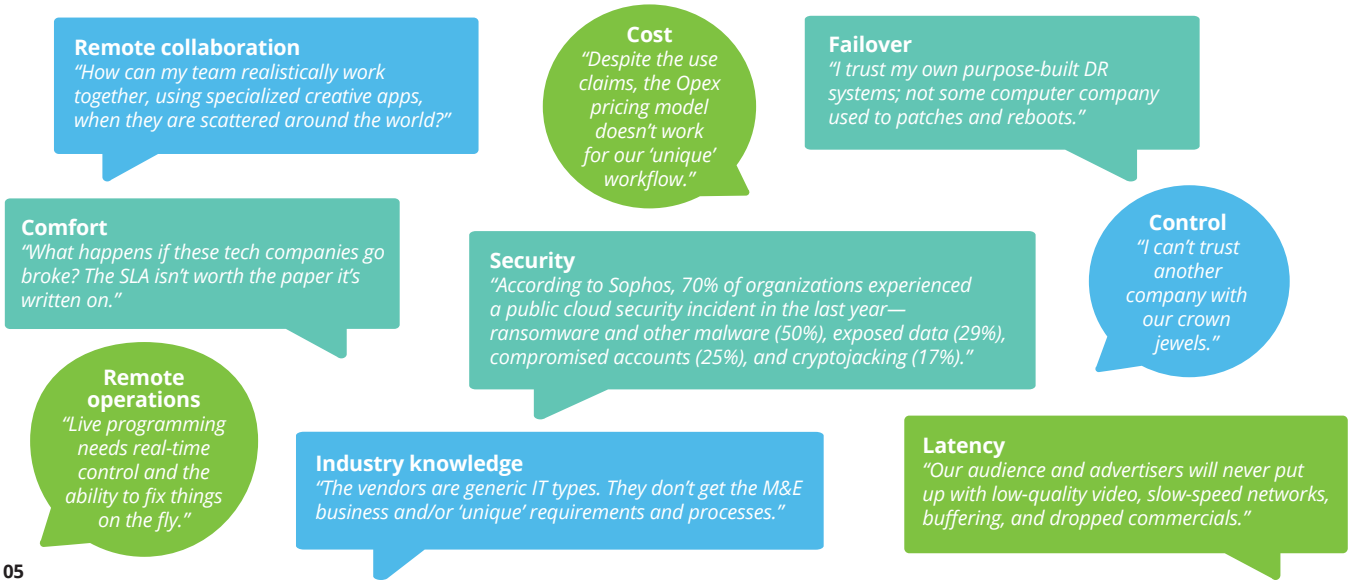
Cloud computing companies provide flexible consumption of services with commensurate pricing, while XaaS companies provide products and services that are paid for based on usage versus up-front purchase or perpetual licensing. Almost three years ago, Cisco's research indicated that companies increasingly preferred to buy advanced capabilities as a service in order to accelerate deployment while limiting time and internal resource investments. According to the research, SaaS would remain the most popular cloud service model through 2021, making up 75% of total cloud workloads and compute instances. Further, overall cloud workloads and compute instances will have nearly tripled (2.7-fold) over the 2016–2021 period.[12] Cisco's predictions seem to be realizable in today's growing market for cloud services.

Increasingly robust cloud and XaaS solutions also provide capabilities that have been able to diminish traditional industry resistance to cloud (figure 3).

With their previous resistance to cloud and usage-based services greatly diminished, M&E companies have been focusing on business drivers and future-state principles for moving to cloud and usage-based services.

The M&E industry's successes to date using cloud platforms for remote creative production and broadcasts have mollified many of the technology's early critics and nudged M&E companies off the cloud "fence" to the point that the industry is publicly recognizing cloud innovators. The National Academy of Television Arts & Sciences presented the Technology & Engineering Emmy Awards for "pioneering public cloud-based linear media supply chains" to Discovery, Fox Networks Engineering & Operations, Amazon Web Services, Evertz, and SDVI. "[13]

Figure 3. Reasons the M&E industry has resisted cloud



Cloud and XaaS capabilities

Control

On-premises, outsourced, public, and hybrid cloud models give broadcast engineers and media technicians more direct control of operations while maintaining the flexibility and cost-sensitivity of each application or data set. Also, cloud providers are handing the keys back to the customer for additional control (e.g., being able to export and hold encryption keys externally)

Security

Cloud security is now recognized as a shared responsibility of companies and cloud providers; both organizations carefully manage and monitor cloud environments to stay ahead of determined cyberattackers. Exabeam reports almost half (44%) of organizations are now using cloud-based security products to protect their data, in a bid to mitigate risk. The company calls this a "dramatic" increase, with only 12% of businesses using cloud-based security solutions in 2019.[14] It is also notable that cloud providers are making massive investments in security (far more than any M&E company would on its own).[15]

Industry knowledge

Selecting vendors with M&E industry knowledge and proven technologies is important to M&E decision-makers and influencers. Realizing this tendency, some cloud service providers heavily recruited leading media technology vendors to their cloud platforms, including companies like Avid, Deluxe, Elemental, Evertz, Grass Valley, SDVI, and Sony Ci.[16,17] Some of these vendors even have cloud-based playout of broadcast programs and streaming media. For example, Netflix's VoD and OTT video services make heavy use of the cloud.

Lower latency

Faster and highly secure ingest portals address studios' concerns with movement times for their enormous file-based assets; direct camera-to-cloud acquisition promises higher speeds in the near future, even while on location. Broadcast distribution strategies are consciously designed for linear and nonlinear multiplatform targets (including live broadcasts) and make use of careful design considerations such as precise automation, scalable cloud resources, edge devices, caching, and adaptive video streams to address latency delays.

Comfort and confidence

Leading cloud service providers – including Amazon, Microsoft, Google, IBM, Oracle, and Sony—are some of the largest, most financially stable, operationally rigorous, technically up-to-date, and highly secure business partners in existence and are fully capable of standing behind stringent service-level agreements.

Business drivers and future-state principles for moving to cloud

New business capabilities

In addition to cost reductions and operational efficiencies, cloud-based digital innovation can enable media companies to experiment, in a lower-cost way, with new business capabilities and service opportunities.

Reduced capital and operating costs

Cloud platforms and usage-based services require less on-premises technology and fewer full-time staff to operate and maintain.

Scalability and agility

Cloud enables flexibility to rapidly increase and decrease computing time, reducing costs via a pay-as-you-go model. This is an especially important hardware utilization issue when companies are experiencing rapid growth or seasonal production spikes. Instead of moving the data to on-premises capex processing power, cloud's opex pricing model allows processing power to be moved to the data on an as-needed basis, reducing the need for dedicated CPUs and frequent and costly data transfers. In addition, since more of the media supply chain is in the cloud, companies don't have to move content in and out of cloud storage (or between different clouds) as frequently.

Resilience

Cloud platforms are built for resilience and can back up applications and data in multiple secure and geographically dispersed locations, enabling better control of failovers.

Envisioning the broadcast cloud

As the trend toward cloud hosting continues, traditional data centers are being phased out to provide faster and more cost-effective services for the end customer. By 2021, cloud data center traffic is projected to represent 95% of total data center traffic.[18]

Traditional M&E technology providers are in the early phase of migrating core functionality to cloud platforms. Looking to the future, technology providers should use business objectives and priorities to drive development of these core business capabilities, which will then be used to drive and optimize a suite of functional capabilities and workflows. The resulting functional workflows can be further enabled by a well-orchestrated set of technical capabilities embodied in systems and their associated data sources and interfaces. What might a broadcast cloud look like from

"The transition from data center to cloud seems inevitable. We're now at the point where large transformation at scale, of getting out of your data centers, is here. There are lots of ways to compute faster and cheaper. Get on to innovation and spend your money there—not on hardware, floor space, and power cooling."[19]

Don Schmidt, managing director, Deloitte

"Coping with the content explosion needed for the streaming wars wasn't possible with traditional TV technologies. To handle that, we needed a fundamental shift in our operations. The vendor ecosystem [and the infrastructures used by TV networks] had to change so we could have much more flexible operations in the future."[20]

Chris Blandy, executive VP of Technology Solutions, Walt Disney Television

a capability and operational perspective? Figure 4 illustrates core broadcast media asset management (MAM) workflows handling the ingest, management, transformation, and packaging of broadcast content for linear and nonlinear distribution.

Characteristics and capabilities of a broadcast cloud's "factory model" media supply chain typically include:

Production

As mentioned previously, COVID-19 has accelerated the demand for remote production operations. For example, at a June 17, 2020, Society of Motion Picture and Television Engineers New York Section meeting, attendees learned that at least 85% of CNBC staff had been working from home (WFH), with only 15% of critical staff located in facilities. NBC News staff working from home included 150 editors and video producers collaborating in real time using NDI monitors for each edit client; 100 media managers, archivists, loggers, and capture managers; and 50 support engineers. CBS's Late Show has been using Zoom for live interview multiviewer and audio control.[21]

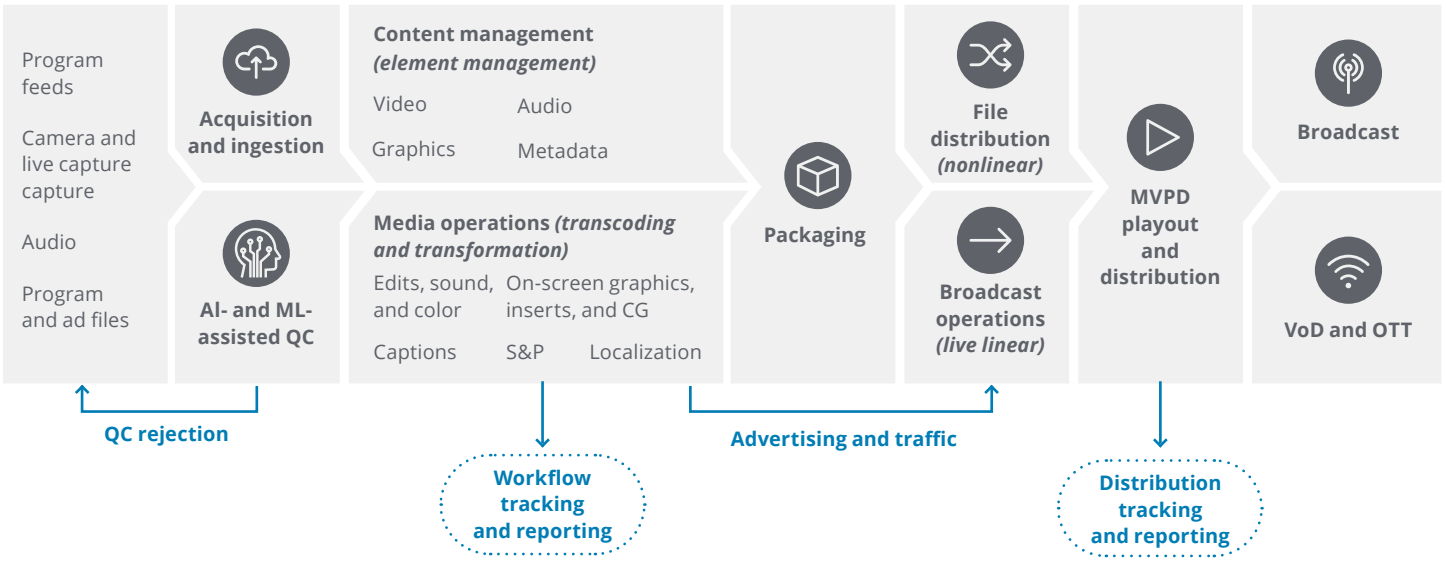
Ingest

Instead of manually inspecting incoming acquisition and contribution files for format conformity and quality assurance, template-based ingest enabled by automated workflows with media processing by exception makes the scalable media factory a new reality. This involves setting up acquisition information models, projects, and tasks of templated types of programs to be acquired and "acquisition logistics" by production category (episode, series, ad, etc.), then validating submissions of elements that go into the program master packages, automating QA where possible, updating metadata, ingesting content, and publishing to subscribing downstream systems.

Media operations

Rather than use manual media transcoding, metadata tagging, and packaging, companies can use automated, factory-like processes to ingest once and produce multiple formats and versions. Core MAM workflows manage the ingest, management, transformation, and packaging of program content for linear and nonlinear distribution.

Figure 4. Broadcast cloud workflows



In addition, they can scale automated media ops by leveraging artificial intelligence and machine learning (AI/ML) capabilities to enable human intervention by exception.[22] Prefulfillment optimization, including localization and compliance, is a critical final step in preparing servicing masters for fulfillment and delivery.

As Brinton Miller at Discovery explains the process, as soon as a piece of content arrives, the media supply chain systems in the cloud can automatically create (at scale) the different formats needed for traditional multichannel video programming distributors, different broadcast standards around the world, and streaming formats for companies such as Hulu and Netflix. The systems also can check features such as closed captioning and determine the quality needed for different outlets, ranging from standard definition to HD and 4K.[23]

Automate and scale multiplatform channel playout and distribution

Template-based distribution, enabled by automated workflows with media processing by exception, makes the scalable media factory a reality. Efficient operations of a coordinated supply chain, using automated scheduling and workflow, can fulfill distribution orders in an omnichannel fashion. Content can then be reused across platforms by generating new versions on demand from the highest-quality program masters and program elements. This allows for the dynamic assembly of programs at the edge using partner and endpoint profiles for any distribution channel, including broadcast, syndication, VoD, and OTT. Miller states that, "Distribution points can be scaled up and down as new products come online, which allows companies to rapidly respond to changing consumer demands and a rapidly shifting digital landscape."[24] Of note, linear (live and scheduled) broadcast workflow for scheduling, playout, and transmission is generally limited to a small set of vendors that offer specialty solution components on cloud and often requires technically sophisticated customization work.

Metrics and analytics

Process tracking across the supply chain enables media companies to determine what program was created (identity), what it costs, and where it went (global distribution rights), as well as to report asset performance.

Seizing the opportunity for fourth-generation broadcasting

What are some common indicators that the opportunity to transition to a cloud-based, fourth-generation broadcasting infrastructure is at hand?

Business acquisitions
Newly merged businesses experiencing technology and application incompatibility may decide to transition to cloud as part of a larger, enterprisewide digital transformation. Contract renewals—periodic renewals of contracts with private data centers, hardware vendors, and software suppliers—allow businesses to consider how services and solutions are currently deployed and the potential benefits of transitioning to a more cost-effective cloud-based solution.

End-of-product life cycle or upgrades
Vendor end-of-life events are optimal times for a business to consider other options and decommission old hardware or licenses to reduce costs and avoid security risks. Businesses undergoing an application update may find it less expensive and more beneficial to transition to cloud.

Scarce or retiring broadcast engineering talent
An aging workforce is another indicator that it may be time to transition to cloud. Legacy or traditionall technology requires extremely specialized skills. Most people who have those skills are near retirement, and replacements are scarce. The move to cloud-based media systems and agile software processes is driving a dramatic reskilling of the broadcast engineering and studio IT professions. The information technology industry provides media companies with a large pool of candidates who are skilled in new digital technologies.

M&E companies beginning their journey to fourth-generation broadcasting should be able to move forward with confidence. As industry adoption accelerates, customers, solution providers, and media standards bodies are expected to work together to address any sync, timing, and interoperability challenges that may arise as they pursue a common goal of providing new service and revenue opportunities for mature broadcast organizations.

"I think the winners of the future in this industry are going to be the ones that figure out how to move their businesses from traditional capital-intensive infrastructures, with long lead-in times, to a more software-defined, cloud-based or cloud-savvy flexible licensing model. Those who have already figured it out and have adopted it are going to gain market share."[25]

Chris Blandy, executive VP of Technology Solutions, Walt Disney Television

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