SOFTWARE-DEFINED VIDEO: A Game-Changing Framework for the Video Marketplace

Introduction

DEFINING THE FUTURE OF VIDEO

The video and television industries are changing so rapidly, it is no longer possible for broadcasters, content programmers, and pay TV operators to keep pace through capital investments in video processing equipment alone. Shifting demands in consumer behavior, portable devices, streaming formats, and encoding standards have raised the bar on what it takes to compete in the video marketplace. Traditional video infrastructure solutions must give way to those that are flexible enough to address new and emerging requirements that are dramatically different from those of the past.

Within a highly fragmented technology landscape, the return on investment of new equipment purchases has become harder to assess. Video providers who invest in legacy technologies can find themselves burdened with outdated equipment in need of replacement. Choosing additional infrastructure based on fixed-function hardware might offer good performance initially, but can be quickly surpassed by more cost-effective and adaptive options that keep pace with the industry's rate of change.

Software-defined video (SDV) solutions offer a way around the dilemma between long-term investments in technology for video delivery and short-term return on investment. Thanks to Moore's law, software running on general purpose processors can now surpass task-specific video processing equipment in terms of both picture quality and performance while simultaneously adapting to market change.

Software-defined video is an infrastructure agnostic approach to implementing flexible, scalable and easily upgradable video architectures. Unlike legacy solutions, this advancement allows video providers to deploy software across an optimal combination of dedicated and virtualized resources in both private and public data centers. A software-defined approach frees video providers from the constraints of dedicated equipment by allowing for the best architecture and processor combination to be used for a particular application, even if that application changes over time. Support for new services and video formats can be integrated seamlessly through simple software upgrades.

In order to lead and manage the transition to new video codecs such as HEVC, advanced audio codecs, advanced color spaces, increased color bit depth, object-oriented audio specifications, forensic watermarking and new display formats like 4K Ultra HD, video providers should look to content delivery services built upon a software-based platform output <u>for any type of device, ranging from smartphones to set-top boxes and smart TV sets</u>.

ADDRESSING MARKET TRANSFORMATION

ADDING MULTISCREEN LINES OF BUSINESS

A video provider's ability to compete successfully in a changing marketplace starts with a video processing and delivery infrastructure that can bring live and on-demand content to viewers on any device. As demand for traditional terrestrial and STB-based TV viewing shifts, multiscreen video presents an opportunity for video providers to expand their offer and build new revenue-generating services. However, a primary challenge that video providers face is how to best address many different types of viewing devices and players simultaneously, including tablets, PCs, smartphones, gaming consoles, and connected TVs.

To address the need to support multiple codecs and streaming formats to accommodate multiscreen viewing, many video providers have adopted software-defined video solutions.

DRIVING INNOVATION THROUGH SOFTWARE

Though fixed-function hardware may provide high performance and good picture quality once it comes to market, a long product life cycle means that the technology has a low likelihood of keeping pace with market changes. The finite nature of traditional hardware-based infrastructure has defined the video processing industry for decades. A hardware-based encoding solution, typically based on ASICs, can take between two to three years to develop and relies on custom components that require significant time and investment resources. As the pace of market and technology transformation continues to accelerate, it is increasingly difficult for these equipment manufacturers to keep up. The lack of commercially available hardware-based 4K HEVC decoders for set-top boxes eighteen months after the specification was ratified is an obvious example of this in the marketplace today. On the encoding side, development is even more difficult.

By choosing the flexibility inherent to software solutions, which offer continual enhancements, video providers can immediately respond to market changes. Support for new features and standards can be added through upgrades and third party integrations. Broadcasters and pay TV operators who choose software-defined video solutions don't have to wait for new hardware releases, they can continually update and enhance their platform in line with technology advancements with simple code changes. Instead of lagging behind consumer trends, they can quickly innovate and create new revenue generating video services.

SOFTWARE-DEFINED VIDEO ARCHITECTURES

THE SHIFT TO SOFTWARE IN VIDEO PROCESSING

All video providers must implement a video processing framework nimble enough to compete in a dynamic marketplace. One of the primary advantages of software-defined video solutions compared to dedicated hardware is the level of scalability, flexibility and performance software offers. By leveraging the most powerful general purpose programmable processers, the power and efficiency of a software solution can follow the same rate of performance and cost enhancements

as standard IT infrastructure. And from an innovation perspective, there is no hardware lag, meaning that new features can be implemented within days, rather than months or years.

LEVERAGING GROUND AND CLOUD RESOURCES

Because software-defined video solutions are built to run on general purpose processors that can reside in public or private cloud infrastructures, integrated cloud platforms can ramp resources up and down depending on demand, preventing overinvestment in infrastructure. By using both ground and cloud-based resources, video providers can fine tune the balance between CAPEX and OPEX in deploying video processing capabilities. In many cases, providers may keep core video processing and delivery in an appliance-based deployment with cloud-based resources handling spikes in demand, testing of new services and providing system redundancy.

At times, a pure public cloud infrastructure can make sense for a video provider. By choosing a robust Platform-as-a-Service solution (PaaS), video providers do not need to make significant capital investments. Both the underlying infrastructure and the video processing and delivery software are available as a complete package that can be purchased on a variable cost basis. Software-based video processing via a PaaS can be a good solution when managing unpredictable levels of processing, storage and delivery demands as resources can be dynamically allocated in real-time. In the end, deciding on the right combination of ground and cloud platform resources involves both technical and financial planning considerations.

VIRTUALIZATION IN PRIVATE CLOUDS

Since a software-defined video processing platform is designed to run on standard computing hardware regardless of its location, it is ideally suited for private cloud environments. Furthermore, an optimal platform offers a heterogeneous solution designed to optimize video processing through selection of the most appropriate processor (i.e. GPU or CPU) for the task. Virtual machines can be allocated for video processing and delivery tasks alongside other business applications like CRM and BSS/OSS. As processing and storage capacities of cloud infrastructures improve, video processing can benefit from increased performance while legacy hardware can then be repurposed for less computationally intensive applications.

SCALING UP AND TO THE FUTURE

Software-defined video solutions can mitigate the risks and costs associated with future system expansion by allowing continual updates and upgrades with minimal impact on physical infrastructure. By using software-based video processing, video providers can take advantage of the continually improving price/performance ratios of off-the-shelf computing hardware as well as virtual cloud resources.

A platform built upon a modular software design allows for even further flexibility and scalability. In dedicated hardware environments, trying to integrate third-party ad messaging or forensic watermarking capabilities means enabling communication with legacy video processing

equipment. By supporting third party integrations, a software platform can allow watermarking, ad servers, analytics and other video functions to be fully integrated into a unified system. Modular software-based platforms can also support a multitude of optional add-ons including video processing specific to device profiles, just-in-time packaging, or audio transcoding. Live-to-VOD features such as nPVR and catch-up TV can also be supported through modular software components.

Perhaps most significantly, software-based platforms can be easily upgraded to support new encoding standards such as HEVC, also referred to as H.265. HEVC promises over 50% bandwidth efficiency gains, enabling new video formats such as 4K Ultra HD or LTE Broadcast. Since it is too early to predict with precision how quickly and successfully these new formats will be adopted, those who decide to purchase completely dedicated HEVC processing equipment early in the game take a huge risk. A software-based approach allows for a more flexible range of future options allowing the solution to follow changes in industry trends around bit depth, color space and content resolution. As H.264 and HEVC video processing can share off-the-shelf and cloud-based processor resources, this can greatly mitigate the risks associated with a new service launch.

CONCLUSION

SOFTWARE-DEFINED VIDEO PROCESSING AND THE WAY FORWARD

The current marketplace for video has greatly changed from the traditional linear TV model of the past. Both consumer and business technology continues to drive changes in the way that content is viewed. Those video providers who manage to fully leverage the power, flexibility and scalability of software defined video processing will be able to continue wowing their viewers and subscribers with compelling and competitive services.

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