Value Added Features in IP Video Workflows

Introduction

IP video workflows are being rapidly adopted by content and service providers as they increasingly deploy VOD and Multiscreen services. In a recent study, market research company Ovum expects the number of online streaming subscribers to surpass 100 million globally by end of 2017 with another 77 million to be added by 2019.

Service providers have to respond to customers demanding access to their favorite video content anywhere, anytime and on more devices. This is adding complexity at the head-end side as more DRM schemes and packaging formats need to be supported. Furthermore, the technology landscape for streaming services keeps changing as new codecs and new adaptive streaming techniques emerge and get adopted. In such a context, selecting the right technology for a new streaming service becomes a complex process as video workflows remain a long-term investment. In making that decision, it is important to ensure that the system provides sufficient flexibility to allow adding new features to attract new customers.

This white paper reviews some of these features and focuses on their impact on the business side whenever applicable.

Software based IP video workflows

Video encoding involves intensive computing tasks that have usually required dedicated hardware acceleration to be properly implemented. However, recent advances in server/CPU architectures have made it possible to migrate towards a fully software based approach. Service providers faced with the decision to select a new multiscreen workflow should definitely consider the new software based solutions that are emerging. Many arguments go in favor of these new solutions. They are listed below.

Software makes it easy to modify and add new features. This is important in the context of the rapidly changing OTT/IPTV technology landscape. The HEVC codec and its adoption is a good example to illustrate the importance of software based implementations. Since it is still early days for HEVC encoding, software implementation will allow simpler upgrades to improve both the video quality and compression efficiency over time. Besides, the industry already anticipates the addition of HDR (High Dynamic Range) as a major new feature for Ultra-HD content but is still debating the standards. Software based video workflows make it possible for operators to invest immediately and deploy their new video services now without waiting until the industry agrees on a common approach.

Other benefits of software based workflows include virtualization and the possibility to migrate to cloud based architectures. Every element of the workflow runs on general purpose CPU resources, and can therefore be virtualized (share hardware resources with other applications) in a local data-center or moved to the cloud. Software based approaches ultimately help optimize the video workflow implementation to find the right balance between local hardware resources that generally determine CAPEX and cloud based resources that drive OPEX. Another advantage resides in the ability to scale resource utilization up and down depending on service load. This is particularly important for VOD services to be able to respond to peak time usage profiles without overinvesting in dedicated hardware resources.

Interlaced content is still widely used by the broadcast industry. Digital HD broadcast widely uses 1080i50/60 formats; moreover standard definition content is exclusively broadcast as interlaced video in 480i/576i formats. VOD content can also be available in interlaced format when it originates from live sport events and TV shows.

While H.264 includes extensive tools for interlaced video, HEVC was primarily designed to efficiently handle progressive video. Interlaced encoding in HEVC can be supported using “Sequence Adaptive Frame Field (SAFF)” which allows the coding mode to be changed between frame coding and field coding at video sequence boundaries.

Transcoding performance

Higher quality

As with every new format, HEVC encoding will improve over time both in terms of video quality and efficiency. To achieve that, it is important that manufacturers are in control of the compression algorithms and not rely on technology provided by 3rd parties. Only in-home R&D with extensive experience in video technology can accomplish such improvements. Furthermore, it allows tracking changes and new developments in the encoding landscape and quickly adding them to the final product.

Higher Density Live encoding

Encoding density refers to the number of programs that can be processed simultaneously. It is typically measured as a number of programs per RU. Denser implementations are preferred as they maximize the utilization of RU space leading to lower installation and operational costs.

HEVC interlaced encoding

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HEVC encoders can decide to only support progressive encoding by de-interlacing the video source. However, Arumai believes that interlaced encoding needs to be considered as it brings extra bandwidth savings that cannot be ignored.

Another notable drawback with the de-interlacing approach is the increased pre-processing which inevitably reduces the number of total services that are supported by the encoder; thus increasing the total cost of the video workflow.

Seamless integration of Ad Insertion schemes

Ad Insertion in IP based video workflows enables new compelling monetization strategies in live multiscreen services. IP based video delivery is by definition a point-to-point protocol, which means that the delivery network has direct link to end-users. The content can therefore be adapted to a specific user or to a group of users based on geographic, cultural or interest criteria.

The video workflow plays an important role in Ad Insertion/Replacement and should provide sufficient flexibility to simplify the overall implementation.

In the first step of this process, the transcoder is responsible for detecting Ad Insertion slots in the video stream and modifying the encoding scheme to add IDR pictures at advert boundaries (a.k.a cue-out and cue-in points). Ad Insertion slots can be signaled via in-band or out-of-band metadata. When the in-band method is used, cue points are inserted in the incoming stream using a standardized scheme defined by SCTE-35 messages. In case of out-of-band signaling, an alternative interface known as ESAM (Event Signaling and Messaging) may be used to provide the information about the cue points.

The streaming server will then communicate with the Ad Decision Service (ADS) to decide which advert to use to replace the proper sections with better targeted adverts. This communication uses two sets of APIs, either SCTE-130 or VAST (Event Signaling and Messaging).

As we can see seamless integration of Ad Insertion in video workflows requires adequate support for industry standards (SCTE-35/130, IAB-VAST…) and sufficient flexibility to implement proprietary methods as needed.

Support for multiple DRM schemes

The fragmentation of the DRM landscape in current OTT offerings needs to be handled properly by video workflows to allow easy integration of different DRM schemes and ensure smooth migration to new systems if needed.

Traditionally, video workflows needed to support a variety of closed DRM options with proprietary key packaging and signaling formats. Very often, this meant increased complexity for operators when they wanted to support more devices as part of their multiscreen service.

In an effort to simplify multi-DRM implementations from different vendors, Common Encryption (CENC) and Encrypted Media Extensions (EME) have been included in DASH and HTML5 specifications. The underlying concept for these new elements is to provide means to allow DRM replacement or addition to accommodate a growing ecosystem of supported devices while leaving the details of the implementation to the DRM system.

Common Encryption (CENC - standardized as ISO ISO/IEC23001-7) provides a common format for encryption metadata such as encryption parameters and key signaling that are stored in the Protection System Specific Header (PSSH). However the details of the DRM implementation itself such as key acquisition, rights management and robustness rules are not specified and left to individual systems. CENC allows the same file to be decrypted using different DRM systems enabling content providers to encrypt their content once and deliver it to multiple client devices with different DRM schemes.

Encrypted Media Extensions provides a set of common APIs to allow a browser to interact with DRM systems and manage license key exchange. EME makes it possible to design a single application for all devices that can run in any HTML5 compliant browser.

Catch-up services

Similarly to Ad Insertion, live (Linear) TV provides opportunities to enrich multiscreen video services by implementing value-added features that leverage the availability of live content in a sliding DVR window at any time as part of the video workflow.

The underlying implementation relies on the nature of popular video streaming formats (HLS and MPEG-DASH) which are based on media chunks (fragmented media content) and a playlist. On the client side, the player reads the playlist to figure out what chunks constitute the continuous media stream to be rendered. These chunks are held in a shared storage for a period of time, therefore allowing any client device to access them at a later time opening up opportunities for new features.

ARUMAI TECHNOLOGIES, INC.

Arumai is the only leading, independent, pure play OTT products and solutions company in the industry today. Arumai's grounding breaking video frame manipulation techniques, proprietary streaming systems and methods, and OTT Video Suite of products make any video content universally enjoyable in high quality on any screen, by any viewer, across any network, at any time enabling a pure play OTT products and solutions company. Arumai-TranStream™ individually and when combined with Arumai-Multiscreen OTT Platform with Social Media Layers for OEMs™ is prepared to deliver millions of content streams to mobile phones/handhelds, tablets/laptops/PCs, Blu-ray Players, Game Consoles, and Smart TVs, and in every market in the world on behalf of content owners, mobile service providers, cable companies, satellite companies, telecom operators, streaming video providers – OTT products and solutions.