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Multiscreen Encoding/Transcoding for Ad-Supported Services

How the encoding/transcoding platform impacts the performance and value of ad-supported services

Multiscreen video content and service monetization models revolve around two main pillars: subscriptions and advertisements. Subscription-based services may range from short-term/pay-per-view to longer-term monthly/ annual commitment for the viewer. Ad-supported services may range from a spray-and-pray, mass targeting to a razor-thin, personalized approach. Those monetization models are widely used today across live/linear as well as VOD services and offerings.

Additionally, several operators (most prominently Hulu and CBS All Access in the U.S.) now employ a hybrid "subscription with limited adverts" monetization model in order to better position their offerings across the consumer segments and maximize their revenue potential. This also improves ad targeting opportunities, as the viewer profile is better known/ tracked through the user's subscription account.

Before pay TV operators and content providers can harvest the full monetization potential of ad-supported services, they need to put in place a complex ecosystem, from acquisition to signaling to targeting to tracking. An essential component of this value chain is multiscreen encoding/transcoding, and that is the focus of this article.

ACQUISITION

In the live workflows, ad opportunities are generally ad-hoc (e.g. a timeout in a basketball game). The encoder platform is expected to process those opportunities in a frame-accurate manner through the following:

- in-band ad signaling, such as SCTE-35 or SCTE-104
- out-of-band API-based ad signaling, such as CableLabs ESAM
- out-of-band API-based timed metadata insertion/injection, such as ID3 tags (e.g. for sidebar, overlay based ads, or VPAID-based ad tracking)
- fingerprinting or AI-based automation for ad detection and replacement

In the VOD workflows, ad opportunities are generally pre-decided (e.g. pre and mid rolls). The encoder platform is expected to process those opportunities in a frame-accurate manner through the following:

- sidecar edit lists, such as CableLabs ESAM XML
- automation/rules (e.g. pre-roll, the first scene change after 15 mins of content)

Most high-end encoder platforms today support one or more of the above practices, and the main challenges are time-accuracy and interoperability. A best-effort approach in ad signaling, instead of a frame-accurate one, severely affects the viewer experience (e.g. a movie scene is cut mid-sentence for an advert).

CONTENT PREPARATION

After the ad opportunities are marked, the content itself needs to be prepared for seamless ad insertion. The encoder platform is expected to do the following:

- Condition the GOP structure of the encoded feed and insert IDR frames at the boundaries of the ad opportunities.
- Adjust the segment duration of adaptive HTTP outputs so that the boundaries of the ad opportunities coincide with the segment boundaries.
- Decorate the corresponding manifests to signal the ad opportunities for downstream DAI components.
- Ensure frame alignment across all adaptive variants and across primary and backup feeds.
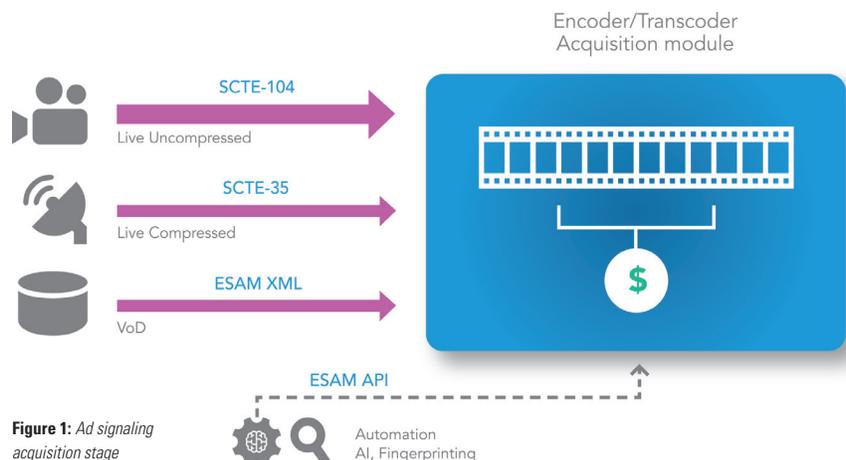

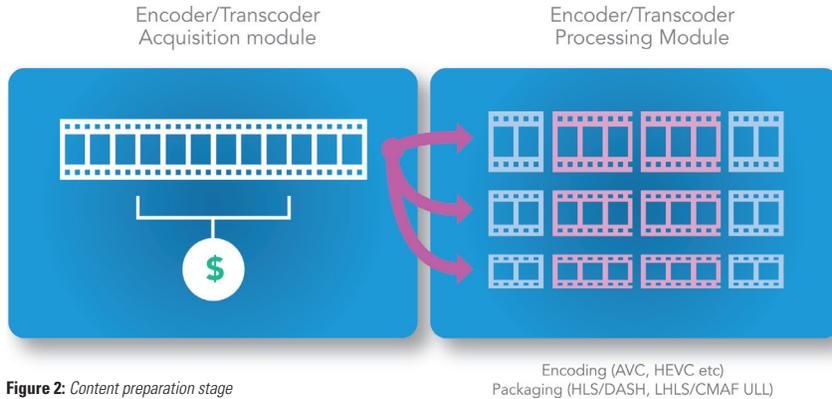**Figure 1:** *Ad signaling acquisition stage*

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Figure 2: *Content preparation stage*

Encoder/Transcoder
Acquisition module

Encoder/Transcoder
Processing Module

Encoding (AVC, HEVC etc)
Packaging (HLS/DASH, LHLS/CMAF ULL)

- Deliver exceptional performance and scalability, in terms of turnaround time, in order to enable programmatic ad insertion, where ad decisions are made within milliseconds.
- Enable audio normalization and loudness management in order to enhance user experience without jeopardizing compliance.
- Allow for payload-level timed metadata insertion/injection (e.g. ID3 tags), to aid ad tracking regardless of the packaging/ delivery protocol.

- Enable features such as overlays, scrolling text, etc., for sidebar-type ad insertion.
- Enable recording automation practices such as ad-free archiving or proof of ad delivery.

    End-to-end interoperability is the key challenge in this stage, as the encoder needs to be standards-compliant across all adaptive delivery technologies and resilient to timestamp drifts and failover events. Further, for live workflows where low latency is a key competitive advantage, the encoder's challenge is to enable dynamic ad insertion (DAI) even in low latency mode (e.g. LHLS or CMAF ULL over HTTP/2).

AD ASSETS PREPARATION

    Apart from the original content, the ad assets also need to be transcoded in order to ensure a smooth user experience. The transcoder platform therefore should achieve the following:

- Match the encoding properties of the original content (e.g. codec, resolution, bitrate, aspect ratio, etc.) across all adaptive variants. This needs to be dynamic and adjustable so that any changes in the content are also replicated for the ad assets by invalidating the corresponding caches.
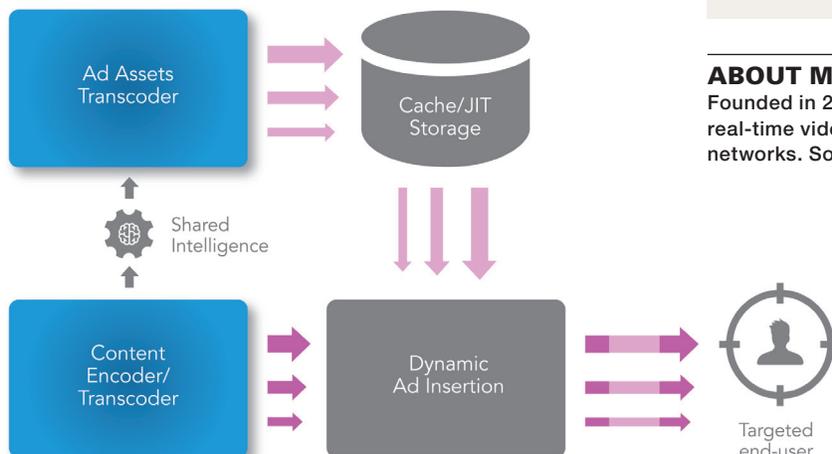
    Most encoder platforms fail to deliver a unified solution across live and VOD workflows, thus the original content and ad assets are often produced by separate independent encoder platforms. This practice introduces artifacts (buffering, flickering, rescaling, audio volume fluctuation, etc.) and severely impacts the user experience, the operator's brand equity and consequently the ROI.

MEDIA EXCEL'S VALUE PROPOSITION

- ✔ Media Excel's HERO product portfolio covers all aspects of multiscreen encoding/transcoding. The HERO software can be deployed as a turn-key appliance, virtualized solution or cloud instance, enabling performance, scalability and orchestration across all form factors.
- ✔ Pristine quality of experience with adaptive encoding for H.264/AVC, H.265/HEVC up to 8K/HDR and ultra-low latency CMAF packaging.
- ✔ Unified and intrinsic support for live-to-live (streaming), file-to-live (playout), live-to-file (catchup, archive), file-to-file (VoD), enabling knowledge sharing across content and ad preparation workflows.
- ✔ Native in/out-of-band ad signaling, timed metadata injection, GOP/ segment/manifest conditioning and ad insertion.
- ✔ Media Excel today supports Fortune 500 clients and global brands for their 24/7 and event-based mission critical deployments in broadcasting, cable, satellite, IPTV, pay TV, OTT/TVE, mobile, and government/DoD with five 9's reliability.

ABOUT MEDIA EXCEL

Founded in 2000, the company has been the industry leader of real-time video processing software to distribute video over IP networks. Solutions from Media Excel provide the reliability, scalability and performance required to deliver high-quality video via appliance and cloud deployment models. Powering more than 500 million multiscreen subscribers globally, and with the largest market share in multiscreen encoding, Media Excel assists pay tv operators, content providers, broadcasters, and telcos worldwide.

To learn more, please visit **www.mediaexcel.com** or contact us at info@mediaexcel.com

Figure 3: *Ad assets preparation stage*

Ad Assets
Transcoder

Cache/JIT
Storage

Shared
Intelligence

Content
Encoder/
Transcoder

Dynamic
Ad Insertion

Targeted
end-user