The increasing popularity of connected devices such as tablets, smartphones, PCs, smart TVs and hybrid set-top boxes (STBs) is driving the evolution of how people consume video. Viewers today want access to their favorite content everywhere, at any time, on any device.

As a content provider, content aggregator, broadcaster or service provider, responding to this desire is critical to the future of your business. The number of consumers demanding TV on their own terms is only increasing, so it’s imperative that you develop a strong multiscreen business model to stay relevant, increase customer loyalty, reduce churn and generate revenue.

Monetizing your multiscreen service offerings with the ability to sell ad space is an essential step toward achieving ROI on your OTT video streaming infrastructure. Establishing advertising within your multiscreen ecosystem, however, must address the complex issues of content rights management and ad delivery via adaptive bitrate (ABR) streaming to the widest possible array of devices. As the industry leader in multiscreen transcoding and delivery solutions, Harmonic can help on all fronts.

Integrating with market-leading advertising ecosystem partners, the Harmonic multiscreen solution provides a complete framework for ad insertion at all levels, covering everything from national ad zones to regional ads to personalized ads. While enabling you to monetize your multiscreen services, the Harmonic solution also leverages multiscreen ad insertion technology to resolve the problem of program restrictions and content rights, and to facilitate cost-effective management of tasks such as blackout and program substitution.

- Part of a complete Harmonic multiscreen solution for both connected devices and ABR-enabled STBs
- Simplified insertion of national, regional and personalized ads
- Seamless integration with industry-leading advertising ecosystem partners
- Blackout slate insertion and program substitution at the national and regional levels
- Compliance with CableLabs’ ESAM specifications
- SCTE 104/35 stream conditioning for seamless playback at ad insertion points
- Playlist annotation for HLS and MPEG-DASH multiscreen ecosystems
**A Complete Multiscreen Ad Insertion Solution**

The Harmonic multiscreen solution is built around our Electra™ X2 and Electra VS encoders, both of which employ the Harmonic PURE Compression Engine™ to provide superior SD, HD and Ultra HD encoding at the lowest possible bitrates. You can even add EyeQ™ real-time video optimization to lower ABR bandwidth consumption by up to 50% while elevating the OTT viewing experience. Also featured are our Electra XT Xtream™ transcoder, WFS™ file-based workflow engine, ProMedia® Origin multiscreen media server, and Harmonic MediaGrid shared storage system.

To address the full spectrum of multiscreen ad insertion workflows, the Harmonic solution is optimized to work with a variety of leading third-party back-office ad monetization platforms and CableLabs-compliant event signaling and management (ESAM) servers. ESAM servers are used to manage placement opportunities, content rights, business rules and ad policies. Our back-office system partners also include playlist manipulators with the ability to insert targeted ads into the ABR stream playlist, depending on factors such as geographical ad zones, group memberships and other analytics. Together, these integrated systems provide a powerful solution for commercial insertion, program substitution and blackout on all connected devices.

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**Ad insertion into live ABR streams**

Electra X2 and Electra VS leverage the PURE Compression Engine to create high-quality ABR video streams from the network feed. Alternatively, the Electra XT transcoder can be used for high-density workflows. With all three Electra systems, SCTE 35 and SCTE 104 ingest and management assures accurate ad placement in the transcoded output. Stream conditioning at ad insertion points, including IDR (Instantaneous Decoder Refresh) frame alignment, ensures that stream playout during ad transitions is seamless. ProMedia Origin, which supports the Apple® HLS, Microsoft® Smooth Streaming and MPEG-DASH ABR streaming formats, interfaces with the playlist manipulator to customize ad playout.

With these capabilities, operators also gain the means to use alternate content or slates to replace programming that is either unauthorized or unlicensed for internet-based delivery. The Harmonic solution can use SCTE 35 messages from the network input and the blackout schedule to insert a slate for the duration of the program blackout. When program replacement is necessary, our solution adheres to the network-based ad insertion model that confirms program switching data with the ESAM interface. The playlist is passed by ProMedia Origin to the playlist manipulator to be customized with the correct program substitute, and is then delivered to the client with the live stream.

**Client-Based Ad Insertion Workflows**

In a client-based ad insertion ecosystem, the consumer device is tasked with receiving both the programming and ad content from the network and seamlessly switching between the two signals. In this scenario the Electra encoder transcodes and conditions the streams at the splice point based on embedded SCTE 104/35 information. Ad files are transcoded into the appropriate file format by a solution such as WFS and are then made available on the origin server. The live SCTE 35 markers are converted into cue in/out triggers and are inserted into the ABR http manifests by the edge device application as annotations to the signal insertion point and avail duration.
Decisions of which ad to play are served to devices from the back-office ad insertion system, with ProMedia Origin delivering the live streams, prepared ad content and HTTP playlist to the client via the CDN. The Video Ad Serving Template (VAST)-compliant application is finally able, on the device side, to decode cue information from the manifest and request alternate ads from the ad server. Thinner clients, such as simple browsers, may not be able to decode cues and therefore cannot replace ads in live applications; however, pre-roll or mid-role ad insertion remains possible.

**Network-Based Ad Insertion Workflows**

To avoid the development and maintenance of device applications, the trend today is to rely on the server or the network to enable ad replacement in the live stream while remaining compatible with the simple browsing experience. This type of video ad stitching on the server side also defeats potential threats from ad-blocking tools, as video ads appear as normal content. In this workflow relevant ad chunks are pushed transparently over the service provider’s network to the client during ad breaks. As in the client-based model, the encoder transcodes and conditions the input streams based on embedded SCTE 104/35 information, while the origin server performs playlist annotation at the appropriate ad insertion points, inserting cue in/out triggers into the HTTP playlist.

The SCTE 130 general architecture for back-office ad-insertion systems includes a Placement Opportunity Information Service (POIS) function, which can provide information to Electra encoders and transcoders through an ESAM interface to confirm both the placement opportunity signaled in the incoming SCTE 104/35 messages and the precise ad segment durations. The POIS or ESAM server can either provide HTTP redirection information to modify the playlist, or create different playlists for different zones or groups. By allowing avails for different zones and groups, this approach enables targeted advertising through both national and local splicing.
Alternatively, a manifest manipulator function can be used to create different playlists for each ad zone or group — or even each viewer. The manifest manipulator retrieves the content manifest with annotations from ProMedia Origin and customizes the manifest by pointing to the relevant ad chunks during the ad break.

As SCTE 104/35 messages embedded in the network input may not carry all required duration information, the transcoder can call to an ESAM server to get additional descriptions for each placement opportunity. This capability may also be used to normalize the SCTE 35 signal across all channels for easier integration with the downstream manifest manipulator.

Operator Benefits
The Harmonic multiscreen ad insertion solution integrates smoothly into all ABR ecosystems deployed today. If you’re looking to make your initial foray into multiscreen service delivery, we provide a complete content preparation and delivery solution that includes live and file-based media transcoding, ABR stream packaging and origination, media storage, time-shifting and manifest manipulation, with unified configuration, management and monitoring of the entire solution in a single workflow.

Business Benefits
A Harmonic multiscreen ad insertion solution not only opens up a new revenue source for operators, but also enables better measurement and reporting capabilities. Much like internet advertising, the unicast and connected nature of ABR technologies allow advertisers to get more accurate measurements of ad viewership and click-through, and can also be tied to online transaction completion. Today’s broadcast TV advertising lacks these tools and must rely instead on statistical sampling and estimates.

In a multiscreen environment, operators can also improve the addressability, granularity and value of advertising messages. Unicast ABR streams allow operators to employ specific criteria to place a different ad into every subscriber's stream. This personalization allows operators to move beyond the ad zones they utilize today for broadcast TV and address individual households — and even individuals within a household, which, of course, is an advertiser's dream.

While broadcast TV advertising is based on the linear 30-second spot, multiscreen advertising allows for additional forms such as pre- and post-rolls, sidebar ads, text crawls and guide-embedded ads, which in turn provide more ad avails. With greater addressability and better measurement and reporting metrics, ads inserted into multiscreen services can deliver more value per view than ads placed in linear broadcast TV.

Harmonic Multiscreen Ad Insertion Ecosystem Partners