Over-the-Top (OTT) Optimized Multi-Screen Video Delivery for Broadcasters
WHERE IS TV EVERYWHERE?
The internet has permeated all other forms of communication, with the sole exception of home television. You can get my email anywhere. You can surf the internet in your car with your smartphone. You can view user generated content on every conceivable topic. However, live broadcast is still largely chained to your living room TV. The view experience is primitive by any standard - although you have more channel choices, you are still limited to a fixed broadcast menu. Where is the capability to view TV program when, where and how you want to?

There is huge consumer interest in a high-quality video experience that is available on any screen, anywhere. Also, consumers want to extend the limited pause and review capabilities of the current channel to all channels, all the time. Consumers have hints of the TVE experience with streaming Video on Demand (VOD) from non-broadcaster 3rd party sources like Netflix. But full TVE capabilities for live broadcasts is still not common. This presents a major opportunity for broadcasters to regain consumer loyalty.

Over-the-top (OTT) transmission techniques can be easily extended into broadcaster’s backbone network or used in conjunction with external Content Delivery Networks (CDNs). This allows the broadcaster to easily augment their current delivery mechanisms and realize the advantages of TVE using low-cost cloud services.

While OTT video delivery has gained popularity, it is not without major challenges. The Internet as a whole is still ill-prepared for large-scale live video delivery to the masses. Video viewing experience varies depending on network conditions and Internet congestion. Many endpoints lack the hardened content protection required for premium content delivery and advanced adaptive streaming for optimal video delivery.

A major issue is managing the “unmanaged” devices consumers want to use for TVE viewing. The proliferation of endpoint devices has a multiplying effect on the number of video formats that need to be prepared, cached and delivered. This is very different from the current broadcaster model of assuming a set top box or television receiving device with known characteristics and performance.

Cost-effective delivery requires solving a number of daunting challenges, including:

- Normalizing devices for proper authentication
- Reducing the explosion of profiles and encodings
- Transmitting over unmanaged networks for large-scale delivery with predictable quality of service
- Integrating with existing back-office infrastructure to support multiple devices
- Centralizing entitlement and authentication
- Providing a common user experience independent of device, network or location
- Optimizing video delivery
- Delivering premium content with consistent content protection across all device types
- Reporting on content viewing and usage metrics

THE OTT PARADIGM SHIFT
OTT, by definition, is a delivery paradigm that leverages Internet Protocol (IP) networks, clouds and content delivery networks (CDNs) to deliver video. It is often classified as an unmanaged delivery method since the networks it leverages can only be indirectly controlled and are subject to network congestion caused by other users and applications.

To broadcasters and premium content publishers, embracing OTT for TV Everywhere means that the delivery of their content is no longer confined to a physical TV set. Instead, any device that is used to receive their content at any time is viewed as an multiscreen TV equivalent. Users demand similar levels of quality and service, even though the providers may not have control over the delivery network. Content distributors and owners will also require reliable viewing metrics to fully account for Nielsen-like content ratings and associated advertising revenue.

TV EVERYWHERE CHALLENGES
To achieve wide end-user acceptance, OTT must replicate the consistent high-quality TV viewing experience when expanding to new video consumption devices. For business reasons, monetization schemes must also extend easily to other screens and provide an increased level of personalization consistent with the individualized nature of many of the new devices.

To realize this vision, broadcasters must:

- Provide a unified and common user experience across all devices, including multi-room TVs, Web-based desktop distribution, and mobile phones and tablets
- Implement a common authentication model that allows authorized subscribers to access their original content
- Possess analytical capabilities to monitor, collect and account for real-time ad content viewing statistics for all OTT screens
The vision is greatly complicated by the number and diversity of endpoint devices that must be supported. For example, most OTT endpoints do not come with complete hardware support for content protection. This makes enhancing device hardening via software the norm, not the exception. Many of these devices do not support advanced adaptive streaming required for quality operation over unmanaged networks. If supported at all, some devices may only support a particular implementation that is hard to normalize from a video preparation perspective.

Broadcasters must evaluate current practices and weed out shortsighted, complex and siloed approaches to today’s TV Everywhere and OTT multiscreen initiatives. For OTT to be a seamless extension of their Web services, several OTT functional gaps must be addressed.

**FLEXIBLE AD MONETIZATION**

OTT delivery brings new third-party monetization opportunities that broadcasters may want to take advantage of in the future. For instance, both Apple® iOS and Google Android™ offer integrated ad platforms that may be leveraged for certain new services. Today’s OTT video delivery lacks the ability to seamlessly integrate with third-party services to support device-specific targeted ads and payment platforms. Flexible dynamic ad insertion along with device hardening and content protection is required for content distributors to both acquire rights and successfully monetize the highest value content on any screen.

**COMMON AUTHENTICATION PROCESS**

Initial TV Everywhere deployments will be anchored by existing subscription with the broadcaster or an affiliate, and will be extended to reach all other devices that are authenticated under the same subscriber. This approach preserves and extends today’s business models, while it unleashes broadcasters and enables them to deliver creative content on all forms of digital media distribution. The challenges are in authenticating new devices in a way that is consistent with how Web and Multiple System Operator (MSO) content are authenticated today, but do so across all distribution channels and deliver the content to all devices. The key to this challenge is finding a common approach that will work across the diverse set of authentication and accounting schemes.

**CONSISTENT USER EXPERIENCE AND INTERFACE**

Consumers have come to expect DVR time-shift services and session shifting between TVs in the home. The burden is on broadcasters to extend this experience to the additional screens. As an OTT dynamic video service provisioning, this requirement implies that user session shifting from one screen to another must also depend on a centralized cloud service agnostic of the transport network, CDN delivery or the actual endpoint device type.

Furthermore, a consistent user experience requires that applications must be developed with cross-screen portability and optimization in mind. The challenge is in striking a delicate balance between a common cross-platform user interface (UI) and individual device optimization. For example, a UI design for phones with a small screen may not look good on tablets with a much larger screen. A common application framework can be used to create device profiles for the presentation layer.

**CONTENT PROTECTION ACROSS DIFFERENT SCREENS**

Most OTT devices by nature are unsecure. This requires that new software protection techniques be implemented to achieve a normalized content protection/Digital Rights Management (DRM) environment. Many devices which are considered secure may only work with a particular DRM backend or may require that a device-specific handshake be performed for content decryption and key storage. Multiscreen video delivery will inevitably evolve into a tiered content-rights scheme based on device types. For example, content-rights enforcement on high-definition-capable devices is more stringent than on smaller electronics gadgets with low resolution. In addition, existing video services for desktops and set-top boxes (STBs) might have embraced DRM back ends which are incompatible with or inextensible to new OTT streaming endpoints. Normalizing device DRM quickly becomes one of the thorniest issues to tackle. And, to further complicate the matter, consistent content protection must be implemented in concert with normalized adaptive streaming delivery.

**OPTIMAL VIDEO QUALITY AND SCALE OF DELIVERY**

Unlike traditional distribution methods, OTT video leverages the public Internet (an unmanaged network) and CDNs for delivery. As such, OTT video is subject to latency and bandwidth fluctuations due to real-time network conditions beyond the control of service providers. And because the underlying networks are shared resources, the delivery of a large number of linear channels presents a particularly daunting challenge. However, with video moving to segmented adaptive streaming delivery and with the presence of native applications, end-to-end OTT control is now possible. This opens up the possibility of intelligent OTT bandwidth management to create a delivery experience that can rival managed delivery.
COMMON MULTISCREEN CONTENT MANAGEMENT, ANALYTICS AND PERSONALIZED SERVICES

As the content management system (CMS) is extended to support multiscreen delivery, it can no longer count on the presence of a managed network or preconfigured set-top boxes for preformatted video delivery. The need to dynamically detect the video format, the associated native player, and also the streaming capabilities for the multiscreen device makes it necessary for the CMS to take on many additional data path responsibilities. This may exceed the capabilities of a CMS, which was originally designed to provide only linear channel content delivery.

In addition, the challenges of monitoring consumer content viewing analytics are much more complicated for OTT delivery. First, unlike traditional set top boxes or conditional access, consumer devices are hard to normalize for ad viewing statistical collection. Second, the fact that OTT is delivered over public networks means that the metadata and service profiling intelligence that exists in today’s service providers’ networks is lost.

To circumvent these deficiencies, OTT content delivery systems can solve these problems only with the help of an intelligent endpoint client and additional server infrastructure. The key lies in how the client collaborates with its OTT servers to provide this equivalent intelligence. Together, they serve as an aggregation point for OTT-specific analytics that can be exported to a centralized metadata and user repository already in the broadcaster’s network.

CAPITALIZING ON OTT AND TV EVERYWHERE

The Azuki Media Platform™ was built from the ground up to support protected premium content delivery to multiple OTT device types. We constructed a next-generation end-to-end dynamic media delivery platform with an intelligent client architecture that supports multi-screen devices and is compatible with existing infrastructure and workflows – not to displace these technology investments, but to interface with them and provide an added level of intelligence for device plus network awareness. As the company leading

OUR SOLUTION FOR NEXT-GENERATION TV EVERYWHERE SERVICES

AZUKI MEDIA PLATFORM™

Designed to help service providers deliver next-generation TV Everywhere experiences and services, the Azuki Media Platform is a dynamic, managed and optimized multi-screen video delivery solution, with intelligent client architecture, that enables:

- Live and VOD content ingestion, both dynamically as well as automatically associated with appropriate metadata, social connections, entitlements and rights information.
- One-time content preparation for multiple platforms/networks.
- Dynamic control and switch of programs and services on the fly.
- Personalization of user experience with no changes to the video stream.
- Dynamic and targeted multi-screen ad insertion and replacement.
- “Follow-me” (i.e., bookmarking) content for live and VOD across multiple devices.
- Time-shifted TV (Start-Over TV, Catch-Up TV and network DVR) for all channels across all screens.
- Flexibility to customize and personalize user interface and experience.
- Social interactivity and third-party integrations.
- Advanced search, discovery and recommendation for any content to be discovered, watched or sent to any device for viewing at any time, online and offline.
- Multi-screen real-time content, consumption-based metrics.
- Full digital rights management (DRM) protection with root of trust at all times.
- On-the-fly robust policy enforcement on any device over any network.
- Flexible multi-screen monetization options.
the video delivery revolution to multiscreens, Azuki Systems is focused on bringing value to customers by simplifying the delivery of OTT Live and Video on Demand (VOD) to any device over any network.

The Azuki solution enables broadcasters to easily and efficiently implement a winning strategy for OTT multiscreen video delivery based on four distinct OTT video delivery principles:

1. A universal client that normalizes all target devices to create a common user experience and consistent content protection
2. A common application/video server (a.k.a. common media preparation server) framework that seamlessly integrates with existing Web and desktop CMS
3. End-to-end OTT bandwidth management intelligence that delivers excellent video quality at a scale rivaling purpose built delivery networks
4. Embedded multiscreen OTT analytical intelligence that extends ad delivery and view statistics to all multiscreen device types

The Azuki universal client presents itself as a set of libraries with a simple application programming interface (API) for applications to reference the requested video in a multiscreen environment. Through this simple binding, Azuki normalizes all aspects of multiscreen video delivery for DRM, adaptive streaming, and back-end CMS access.

The Azuki Media Platform, which is functionally equivalent to today’s application and media server, is an OTT-optimized server that seamlessly connects with the existing CMS, and takes on the additional responsibility of forming an end-to-end overlay with the Azuki client for the purpose of creating a managed multiscreen OTT experience. This innovative, standards-based approach is key to building a scalable over-the-top video delivery framework without requiring a purpose-built network infrastructure. Furthermore, it makes it possible to collect analytics across all OTT device types to enable multiscreen ad insertion and content viewing statistics.

The Azuki architectural principles each provide the following key multiscreen delivery benefits:

**AZUKI UNIVERSAL CLIENT**
- Supports desktops, smartphones, tablets, smart TVs, OTT STBs and game consoles
- Common application and application UI for all screens
- Session shifting and user-session management across screens

**APPLICATION/VIDEO SERVERS**
- A single workflow and common application/video server for OTT delivery of video to all screens
- Works in concert with existing CMS and CDN of choice
- Universal DRM, simultaneously supports multiple DRM types
- Simplifies, automates and reduces the number of video formats and mezzanine files for multiscreen delivery

**END-TO-END BANDWIDTH MANAGEMENT AND OTT VIDEO DELIVERY**
- Together with the universal client, delivers video over unmanaged networks with managed and optimized video delivery
- Supports both linear channels (Live) and nonlinear content (VOD)
- Provides large-scale linear channels via parallel CDN upload intelligence
- Intelligent client-side caching and preloading for quick channel switching

**SEAMLESS CMS INTEGRATION AND ANALYTICAL INTELLIGENCE**
- Extend CMS with a normalized multiscreen delivery capability for content protection, adaptive streaming and multiple CDN support
- Collection of real-time viewing statistics from universal client to common application/video servers
- Ability to export statistics from video servers to an external third-party analytics engine for reporting, analytics and monetization
- Real-time data correlation between viewing device, user and content
- Normalized user ID management for cross-affiliate user

- Pre-approved affiliate authentication application logic
- Device hardening for multiscreen protection with a common
- DRM backend
- Best video quality with multiscreen adaptive streaming
- Analytical data collection for real-time user and content tracking
- Normalized dynamic ad insertion intelligence and subscription-based billing
- Common electronic programming guide (EPG) interface for all devices
entitlement, billing and accounting management

Normalized ad insertion support to multiple third-party ad platforms

PERSONALIZING SERVICES:

Real-time logging and association of device, user and content metadata

Connector interfaces to:

Major third-party recommendation and analytical engines

Service-provider-specific digital storefronts and programming guides

APIs to social networking systems

MONETIZING NEW OTT CONTENT DELIVERY OPPORTUNITIES BY LEVERAGING:

One common application API to support multi-device or OS-specific ad and subscription platforms

Templates for various online and offline monetization options including:

Subscription

Authentication

Rental

PPV

AZUKI SYSTEMS: OPTIMIZING OTT MULTI-SCREEN VIDEO DELIVERY

TV Everywhere, over-the-top delivery and the rapid growth of powerful endpoint devices have forever changed how we view and interact with content. Broadcasters now have the opportunity to capitalize on these changes by increasing distribution, driving new revenue streams and improving customer satisfaction. To do so, however, broadcasters must build a flexible video delivery foundation based on industry standards and their existing infrastructure.

Many vendors claim they can deliver OTT video to multiple devices, but few have the experience and the technology to back it up. While traditional video vendors are attempting to cobble together a TV Everywhere story based on legacy products, the Azuki Media Platform was built from the ground up to solve the unique challenges of next-generation multi-screen OTT video delivery.

With Azuki, broadcasters can deploy true TV Everywhere with rich, protected content on multiple screens in under 90 days. We integrate with your existing video delivery infrastructure – seamlessly. We leverage open standards such as HTTP Live Streaming (HLS), while ensuring future-proof extension to the Moving Picture Experts Group (MPEG) Dynamic Adaptive Streaming over HTTP (DASH) and MPEG International Standard (IS).

Azuki is transforming the way video is viewed today by enhancing the power of over-the-top video delivery with security, quality, scale, reliability, and personalization.

Azuki Systems is leading the video delivery revolution to any screen over any network. Azuki’s solutions deliver rich, protected content to any device over any network, allowing service providers to take the complexity out of TV Everywhere (TVE) delivery. The Azuki Media Platform™ enables service providers, mobile operators and brand-name media to combine the power of over-the-top delivery with the highest quality of user experience, content protection, back-office integration and reliability. Azuki is led by an executive team renowned for repeated success in launching disruptive technologies and solving difficult technology challenges to provide customers with a competitive edge. Visit www.azukisystems.com for more information.

Azuki Systems, Inc. • 43 Nagog Park, Acton, MA 01720

1.978.844.5100 • www.azukisystems.com • info@azukisystems.com

OVER-THE-TOP (OTT) OPTIMIZED MULTI-SCREEN VIDEO DELIVERY FOR BROADCASTERS WHITE PAPER