Wowza Streaming Engine™ – Overview

Wowza® Media Systems, LLC.
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Contents

Introducing Wowza Streaming Engine

Delivering content to any screen has become the most important broadcast industry trend, ranked significantly higher than any other, according to the Devoncroft Partners 2012 Big Broadcast Survey (BBS). Wowza® Media Systems recognized this trend in 2007 when it rolled out its industrial-strength Wowza Streaming Engine™ software, which at the time was called Wowza Media Server®. Today, customers in more than 150 countries use Wowza software to simultaneously stream content to PCs, smartphones, tablets, IPTV set-top boxes, and other devices.

Wowza Streaming Engine is robust, customizable, and scalable server software that powers reliable streaming of high-quality video and audio to any device, anywhere. Use it to build video and audio applications and services that deliver engaging streaming for live events, news, surveillance, training, and on-demand videos. Whether deployed in the cloud or on-premises, you can leverage the powerful components and APIs of Wowza Streaming Engine to tailor streaming workflows with security and confidence.

Key Benefits

Any Media to Any Device—Anywhere, Simplified

Wowza Streaming Engine accepts any video format and reliably delivers it in multiple formats and with the highest possible quality to any connected device, anywhere. Platform-agnostic, multi-format, and multi-screen, Wowza Streaming Engine accepts any video format and delivers content to the broadest range of player technologies and screens, including Adobe® Flash® Player; Microsoft® Silverlight® player; Apple® iPhone®, iPad®, iPod touch®, and QuickTime® player; Android™ smartphones and tablets; a variety of smart TVs; and IPTV/OTT set-top boxes.

Flexibility and Control

Every organization has unique needs and requirements, which makes one-size-fits-all streaming solutions too limiting. Dedicated, customizable, and extensible, Wowza Streaming Engine software integrates with third-party systems and includes powerful components, called *AddOns*, and APIs that let you build solutions that grow and adapt to your evolving streaming needs.

Engaging View Experiences

Wowza Streaming Engine provides tools to that let you enhance your audience's viewing experience and maximize your reach as a content publisher. You can offer viewers DVR-like features such as play, pause, and rewind; include closed captioning for hearing-impaired viewers; reach global audiences by offering audio in a choice of languages; and offer immersive surround-sound audio.

High Performance and Scalability

Wowza Streaming Engine is multi-threaded software that delivers live and on-demand streaming from standard on-site hardware or through the cloud, letting you make the most of your hardware, networking, and other resources. You can scale out live and on-demand streaming across large regions and audiences, push live video to content delivery networks (CDNs), and choose from unicast or multicast transmission.

Multiple Levels of Content Security

Wowza Streaming Engine offers a wide variety of security options so that you can protect your streams, networks, and audio and video assets. Choices range from standard support for Flash RTMP encrypted streams and HLS AES-128 protection to studio-approved Digital Rights Management (DRM).

Serving Many Markets

Wowza Streaming Engine simplifies online video-delivery workflows to improve productivity for thousands of organizations, large and small, in many industries and markets, including:

- Content publishers
- TV broadcasters
- Radio broadcasters
- IPTV/OTT service providers
- K-12 and higher educational institutions
- Houses of worship
- Hosting companies
- CDN and streaming service providers
- Government organizations

See how Wowza Streaming Engine can benefit you at www.wowza.com/customers.

Simply Powerful Streaming

Today's viewers are a demanding lot. They want their content everywhere—on their PC now, on their tablet tonight. So you, as a content producer, can't be tethered to a specific streaming technology. You have to have to reach your audiences where they are: on any screen—whether it's a computer, mobile device, smart TV, or set-top box—at any time. And this, to say the least, makes content production and delivery challenging.

Streaming the Wrong Way: Segregated Workflows

Conventionally, content producers have used separate encoders and client-specific servers to deliver streams to different players. This approach is costly on several fronts. First, you have to make a large capital investment to acquire multiple client-specific encoders and servers, and then incur the costs of managing separate delivery workflows. If you can't afford to maintain multiple, separate infrastructures, you're limited in the number and types of delivery options you can offer.
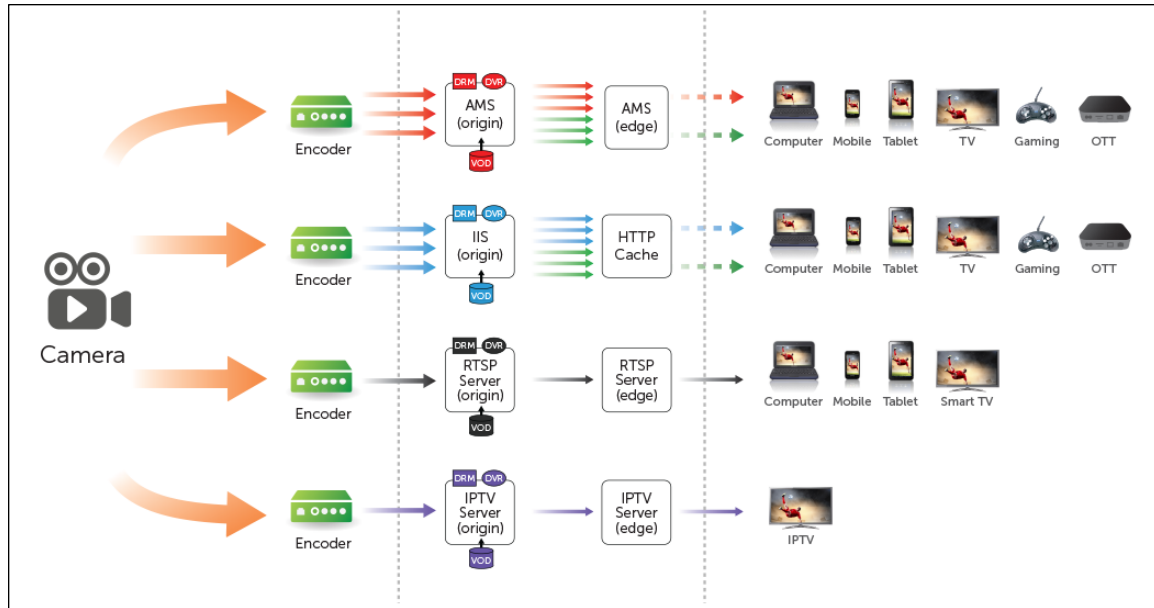
Figure 1. Conventional, segregated streaming workflows are capital-, resource-, and labor-intensive.

Streaming the Right Way—with Wowza Streaming Engine

Wowza Media Systems developed its powerful streaming software to address the technological and operational efficiencies of multiple, parallel streaming workflows. Indeed, Wowza Streaming Engine software transforms the way organizations deliver streaming content. With Wowza Streaming Engine, you can stream from a single H.264 encode (either live or on-demand) to all client types, eliminating the need to invest in client-specific encoders and servers. This reduces operational costs associated with the hardware you need to maintain and simplifies the management of the production workflow, allowing you to focus on a unified server infrastructure and deliver the best possible viewing experience to your customers.

With Wowza Streaming Engine, you can choose from a broad range of conventional live RTSP/RTP, MPEG-TS, and RTMP-based encoders, or accept source video from H.264 IP cameras or the Wowza GoCoder™ mobile encoding app. With the Wowza Transcoder AddOn, which is deployed on the same hardware with Wowza Streaming Engine, you can ingest high-bitrate streams and transrate them into adaptive bitrate (ABR) or single bitrate streams for delivery over supported protocols. For VOD, Wowza Streaming Engine can stream simultaneously to multiple clients from a single set of MP4 files.

Figure 2. Wowza Streaming Engine ingests video from a variety of sources and outputs to a variety of formats for playback on many devices.

Wowza sets a new benchmark for media servers in terms of functionality, performance, flexibility, and security. It effectively addresses the challenges that content owners and producers face when delivering streaming content in the face of rapidly proliferating and ever-evolving video-capable devices that rely on diverse playback technologies and protocols.

Finally, Wowza Streaming Engine is geared for high performance. Its tightly architected 64-bit Java server is built for multi-protocol, multi-client media streaming. It scales effectively to meet the growing demand for streaming content and its industrial strength architecture is specifically tuned to efficiently use the modern generation of highly-threaded multi-core CPU and memory resources, as well as higher storage I/O capacities. This scalability allows you to increase the efficiency of your server infrastructure and benefit from the opportunities offered in a rapidly growing market.

For more on how Wowza streaming works, go to www.wowza.com/streaming.

Delivering Any Media to Any Device, Anywhere

With Wowza Streaming Engine, you can deliver live video and audio H.264 streams to any player, any device, over any protocol supported by Wowza software, simultaneously from a single set of source live streams. You don't have to create individual assets for the dozens of possible variations— or for the new protocols that come to market seemingly every time you blink.

Broad Live Encoder Support

Wowza Streaming Engine can accept incoming streams from H.264 encoding devices (encoders, transcoders, IP cameras, etc.) that use RTSP, RTP, and MPEG-TS protocols. This gives you great flexibility to choose an encoder that fits your operation and budget, regardless of the protocol used to deliver content to the user device. For more details about supported encoders, go to www.wowza.com/forums/content.php?8-live-streaming-and-encoders.

In addition, Wowza enables mobile content operators to encode and broadcast live audio and video through the Wowza GoCoder encoding app for Apple iPad and iPhone (iOS 5.0 or later). You can use Wowza GoCoder to broadcast HD-quality live events using H.264 adaptive bitrate streaming. Wowza GoCoder connects to Wowza Streaming Engine over 4G, 3G, and Wi-Fi networks. For more information, go to www.wowza.com/addons/gocoder.

Wowza Streaming Engine repackages (transmixes) the incoming video/audio payload into the streaming formats required by the destination devices. For example, if Wowza Streaming Engine is receiving H.264 over MPEG-TS from an encoder for streaming to an iOS device, the server first segments the payload into .ts chunks and then delivers the chunks using the HLS streaming format to the device.

When you use Wowza Transcoder AddOn, the server can ingest an even greater range of encoding protocols. Wowza Transcoder AddOn can accept channels (streams) containing video encoded in H.264, MPEG-2, or MPEG-4 formats with a variety of audio encoding formats such as AAC, MP3, Speex, and G.711. It transrates or transcodes these channels to multiple bitrates of H.263 (v2) or H.264 video and AAC audio for adaptive or non-adaptive bitrate delivery over any outbound transport protocol supported by Wowza Streaming Engine.

Additionally, you can use Wowza Streaming Engine can to re-stream SHOUTcast and Icecast (AAC, AAC+, and MP3) audio streams and IP Camera (AAC, G.711 (µ-law and A-law), H.264, and MP3) streams, which makes these streams accessible to listeners on supported player technologies.

For an up-to-date list of supported encoding formats and transport protocols, go to www.wowza.com/media-server/specifications.

Broad Outbound Protocol Support

Wowza Streaming Engine supports many client and player protocols, including Apple HLS, Adobe HDS, Microsoft Smooth Streaming, MPEG-DASH, and others.

Apple HTTP Live Streaming (iPhone, iPad, iPod touch, QuickTime, and More)

Wowza Streaming Engine can stream adaptive bitrate live and on-demand video to the iPhone, iPad, and iPod touch (iOS version 3.0 or later); QuickTime player (version 10 or later); Safari® browser

(version 4.0 or later); and other Apple HTTP Live Streaming (HLS)–compatible devices such as Roku® and Amino set-top boxes and some brands of smart TVs that use the Apple HLS protocol. Adobe HLS is a streaming protocol that uses small, discrete HTTP files or "chunks" for delivery. All media-chunking and packaging required to deliver a stream using the protocol is performed on the fly by Wowza Streaming Engine. When streaming video on demand content, Wowza Streaming Engine supports MP4 files (QuickTime container) and MP3 files (FLV files aren't supported at this time). Apple iOS devices and Apple TV® digital media extender support the following formats:

Video	Audio
• H.264	• AAC, AAC Low Complexity (AAC LC), High Efficiency AAC (HE-AAC) v1
	• Dolby® Digital 5.1 Surround Sound (AC-3) and Dolby Digital Plus (Enhanced AC-3 or E-AC-3)
	• MP3

Adobe HTTP Dynamic Streaming (Adobe Flash Player)

Wowza Streaming Engine can stream adaptive bitrate live and on-demand video to Flash Player–compatible devices (Flash Player 10.1 or later) using the Adobe HTTP Dynamic Streaming (HDS) protocol. Similar to Apple HLS, Adobe HDS is also a chunk-based HTTP streaming protocol. All media-chunking and packaging required to deliver a stream using this protocol is performed on the fly by Wowza Streaming Engine. The Adobe HDS protocol supports the following codecs:

Video	Audio
• H.264	• AAC, AAC Low Complexity (AAC LC), AAC High Efficiency (HE-AAC) v1 and v2
• On2 VP6 (live only)	
• Screen video and Screen video 2 (live only)	• MP3
	• Nellymoser Asao (live only)
• Sorenson Spark (live only)	• Speex (live only)

Microsoft Smooth Streaming (Microsoft Silverlight and More)

Wowza Streaming Engine can stream adaptive bitrate live and on demand video to Microsoft Silverlight and other Smooth Streaming players using the Microsoft Smooth Streaming protocol. Silverlight, the best-known of the Smooth Streaming clients, is a cross-browser, cross-platform technology that exists on many personal computing devices. Smooth Streaming is a chunk-based streaming protocol that uses HTTP for delivery. Wowza Streaming Engine performs all media-chunking and packaging required by Smooth Streaming on the fly, so you don't need specialized segmenting encoders or an IIS web server. The following formats can be used when streaming to Smooth Streaming clients:

Video	Audio
• H.264	• AAC, AAC Low Complexity (AAC LC), AAC High Efficiency (HE-AAC) v1 and v2 • Dolby Digital 5.1 Surround Sound (AC-3) and Dolby Digital Plus (Enhanced AC-3 or E-AC-3) • MP3

MPEG-DASH (DASH Clients)

Dynamic Adaptive Streaming over HTTP (DASH), also known as MPEG-DASH, is an evolving international standard for adaptive streaming. Wowza Streaming Engine supports the MPEG-DASH standard, which offers all the benefits of Apple HLS, Adobe HDS, and Microsoft Smooth Streaming but with a single, streamlined encoding workflow.

MPEG-DASH is similar to proprietary adaptive streaming technologies such as Apple HLS, Adobe HDS, and Microsoft Smooth Streaming in that it's a chunk-based streaming technology that uses HTTP for delivery. All media-chunking and packaging required to deliver a stream using this technology is performed on the fly by Wowza Streaming Engine.

The MPEG-DASH standard (ISO/IEC 23009-1) defines segment container formats for ISO Base Media File Format (ISOBMFF) and MPEG-2 Transport Streams (MPEG-2 TS). MPEG-DASH is codec-agnostic and supports multiplexed and non-multiplexed encoding. Multiple content protection (DRM) schemes are supported; however, a Common Encryption (CENC) standard (ISO/IEC 23001-7) is being developed in conjunction with MPEG-DASH to allow content to be encrypted once and then streamed to DASH clients that support different licensing systems.

With support for MPEG-DASH in Wowza Streaming Engine, you can:

- Efficiently reach a broader audience with HD content at lower bitrates

- Deliver live and on-demand content in MPEG-DASH format

- Play back on DASH-AVC/264-compatible players

- Protect live and on-demand DASH streams using Common Encryption

- Deliver content over both DASH and non-HTTP protocols when using Wowza in an origin-edge configuration

- Deliver audio-only or video-only content

- Deliver streaming content that uses the Dolby Digital Plus audio codec

For more information about MPEG-DASH support in Wowza Streaming Engine, go to www.wowza.com/products/streaming-engine/features/mpeg-dash.

RTP/RTSP (QuickTime, VLC, 3GPP Devices, Set-top Boxes, and More)

Wowza Streaming Engine can stream live H.264, AAC, and MP3 content to players and devices that support the Real Time Streaming Protocol (RTSP), Real-time Transport Protocol (RTP), and MPEG-2 Transport Stream protocol (MPEG-TS). This includes players and devices such as QuickTime Player, VideoLAN VLC player, IPTV set-top boxes, and 3GPP devices. Wowza Streaming Engine supports RTP

and MPEG-2 TS input and output over UDP as well as multicast. In addition, Wowza Streaming Engine supports interleaved RTSP/RTP (which is where the RTP part of the stream flows over the RTSP TCP connection), which enables RTSP/RTP to be delivered in network environments that don't allow UDP transmission.

Supported Video-on-Demand (VOD) Formats

Wowza Streaming Engine supports many VOD file formats, including FLV (Flash Video - .flv), MP4 (QuickTime container - .mp4, .f4v, .mov, .m4a, .m4v, .mp4a, .mp4v, .3gp, and .3g2), PIFF (.isma and .ismv), and MP3 content (.mp3). H.264/AAC content in MP4 container files can be delivered to any supported player technology.

Innovative Functionality

Wowza Streaming Engine offers many innovative features and functions, from a browser-based administrative dashboard that lets you create, manage, and monitor streams to support for closed captions, live stream recording, and robust security options.

Browser-Based Management and Monitoring

Wowza Streaming Engine Manager lets you easily configure, manage, and monitor Wowza Streaming Engine server software from a web browser on your computer, tablet, or phone. Although programmatic and command-line configuration and management of Wowza Streaming Engine is available, the browser-based manager enables publishers with a diverse range of technical abilities to have greater control and confidence when streaming video.

With Wowza Streaming Engine Manager, you can create a live or VOD application for any event or content that you want to broadcast, including single-server or origin-server applications, edge applications, and HTTP origin applications, depending on the size and scale of your broadcast and the types of playback you want to support. For even simpler app-creation, you can specify default settings and properties that apply to all of your streaming applications, such as creating SMIL files for adaptive bitrate streaming. Then, customize or refine these settings for individual applications.

With Wowza Streaming Engine Manager you can also perform a host of administrative tasks, such as establishing secure log-ins and permissions for managing license keys, configuring security options, and managing IP addresses and port-based virtual hosting environments. You can configure and enable Wowza AddOns, including Wowza Transcoder AddOn, using the manager.

Finally, you can monitor resources for any individual application, in real time or historically, using Wowza Streaming Engine Manager. For more information on Wowza Streaming Engine Manager, go to www.wowza.com/products/streaming-engine/manager.

Figure 3. Wowza Streaming Engine Manager lets you configure, manage, and monitor Wowza Streaming Engine server software from a web browser on your computer, tablet, or phone.

Closed Captioning

Wowza Streaming Engine supports many closed captioning formats for live and VOD streams. It can ingest caption data embedded in live streams and from a variety of file-based sources and convert the data to appropriate caption formats for live and on-demand video streaming using the Apple HLS, Adobe HDS, and RTMP protocols. This helps broadcasters to comply with the 21st Century Communications and Video Accessibility Act (CVAA) of 2010 and with increasing requirements in the European Union by providing captioning for television programs that are distributed over the Internet.

For live streams, Wowza Streaming Engine can ingest closed caption information from Action Message Format (AMF) onTextData events, onCaption events, or CEA-608 data embedded in the stream. These ingested captions can be delivered in Adobe HDS and RTMP streams as AMF onTextData events, in Apple HLS streams as CEA-608 captions, or in Apple HLS streams for Apple iOS devices (iOS 6 or later) as Web Video Text Tracks (WebVTT) subtitles. In addition, CEA-608 caption data embedded in the stream can be passed through Wowza Transcoder AddOn for delivery in Apple HLS streams to iOS-based devices.

For VOD streams, Wowza Streaming Engine can extract caption data from 3GPP Timed Text data embedded in MP4 files or use caption files in a variety of formats including Timed Text Markup Language (.ttml), SubRip Text (.srt), Scenarist Closed Caption (.scc), and Web Video Text Tracks (.vtt). These ingested captions can be delivered in Adobe HDS and RTMP streams as AMF onTextData events, in Apple HLS streams as CEA-608 captions, or in Apple HLS streams for Apple iOS devices (iOS 6 or later) as WebVTT subtitles. Wowza Streaming Engine also supports delivery of VOD sidecar files.

Live Stream Recording

Wowza Streaming Engine allows you to instantly record any incoming live stream to either the Flash Video (FLV) or MP4 (QuickTime container) format and to automatically split the in-progress live stream recording archives into multiple files, with the split points based on video duration, clock time, or file size. You can use Wowza Streaming Engine Manager to control the recording process locally or from a remote computer and specify when the recording starts and stops, the filename and location, the container format, and other details. Recordable live stream sources can be any compatible live video device, including webcams encoded through the Flash player, encoders, IP cameras, the GoCoder mobile encoding app, or streams originating from Wowza Transcoder AddOn.

Live stream recording is particularly useful for offering video messaging services, such as video email, instant video feedback on websites using modern browsers, or for surveillance, training, education, or other applications that require content archiving for later replay.

Wowza nDVR AddOn provides special recording functionality that permits time-shifted playback of live streams on HDS, HLS, and Smooth Streaming–compatible devices. It records live streams into a format-normalized cache while simultaneously allowing users to play or pause a live stream, rewind to a previously recorded point, or resume viewing at the current live point. An extensive set of APIs is available to build custom applications such as catch-up TV for creating an even more engaging viewer experience.

SHOUTcast Re-streaming

Thanks to the exclusive Wowza Streaming Engine capability of SHOUTcast/Icecast re-streaming, delivering the best-sounding AAC/MP3 audio to the biggest audiences on the Internet has never been easier. This capability simplifies audio delivery by eliminating the need to install SHOUTcast-specific players on every client machine and device.

Multiple Levels of Content Security

One of the inherent advantages of streaming media is that it offers better content protection and security than progressive downloading. However, streaming your content doesn't always provide sufficient security against content intrusion, unauthorized diversion, spoofing, and stream ripping.

Wowza Streaming Engine provides several levels of protection to help guard your content against these threats.

First, you can implement several types of all-around content protection for your streams. To help protect content delivered using Apple HLS, Adobe HDS, Microsoft Smooth Streaming, and MPEG-DASH, you can apply SecureToken challenge/response queries, RTMP and RTSP authentication, stream name aliases, and encrypted streaming (RTMPE, RTMPTE, and RTMPS). For Flash, Wowza Streaming Engine offers SecureToken protection, link encryption (RTMPS, RTMPE, RTMPTE), and free AddOns for implementing other security measures, such as content URL protection and domain verification. All of these security options can easily be implemented in the Wowza Streaming Engine Manager.

In addition, for premium content, Wowza DRM AddOn offers studio-approved DRM protection by providing integration with various third-party DRM Key Management Services. These services, from BuyDRM™, EZDRM, and Verimatrix, deliver license keys to Wowza Streaming Engine during encryption and to the viewer's device during playback. Wowza DRM AddOn, which can be configured and enabled in the Wowza Streaming Engine Manager, greatly simplifies on-the-fly encryption with key rotation for delivery of live and VOD premium content to standard PlayReady and Verimatrix ViewRight® clients.

In addition, Wowza Streaming Engine includes APIs that enable several encryption schemes for on-the-fly encryption of live and on-demand Apple HLS streams, including basic AES-128 encryption (chunk-level encryption supported by iOS and OS X players), SAMPLE-AES (sample-level encryption for version 5 of the Apple HLS streaming protocol), ENVELOPE-PLAYREADY (supported by BuyDRM player technology with Microsoft PlayReady DRM), and CHUNK-PLAYREADY (supported by INSIDE Secure® player technology with Microsoft PlayReady DRM).

An API is also provided that enables decryption of PlayReady assets. This enables new scenarios, such as flexible delivery within closed-network hospitality environments. For example, you can transport HD mezzanine files to a location such as a hotel, airplane, or cruise ship, and then decrypt the assets, transcode them to multiple adaptive bitrate streaming formats, re-encrypt them, and deliver them to users' own devices.

For more information about the many ways that you can protect your streaming media with Wowza Streaming Engine, go to www.wowza.com/products/streaming-engine/features/security.

An Expansive Suite of Premium AddOns

A variety of premium AddOn components are available to help you deliver, transform, enhance, protect, and manage your audio and video streams.

Wowza Transcoder AddOn

Wowza Transcoder AddOn, which has been mentioned extensively in this Overview, provides the ability to ingest a live stream, decode the video and audio, and then re-encode the stream to suit the desired playback devices.

Wowza Transcoder AddOn runs on the same hardware as Wowza Streaming Engine to transform incoming live streams from encoders, IP cameras, IPTV headends, and other live sources into multiple stream sets for H.264-everywhere adaptive bitrate delivery to Adobe HDS, Apple HLS, Microsoft Smooth Streaming, and RTMP clients. Wowza Transcoder AddOn also delivers non-adaptive streams over any transport protocol supported by Wowza Streaming Engine, including RTMP, HDS, HLS, RTSP/RTP, MPEG-TS, and Smooth Streaming. CEA-608 caption data embedded in live streams can be passed through Wowza Transcoder AddOn for delivery in Apple HLS streams to iOS-based devices. If available, Wowza Transcoder takes advantage of Intel® Quick Sync, NVIDIA® NVENC, or NVIDIA CUDA® GPU acceleration to free up CPU for more outbound streaming capacity.

Wowza Transcoder AddOn also lets you overlay static images on top of video using simple XML file configuration, or to overlay static and dynamic images by using a Java-based API. This powerful tool lets you create premium, branded experiences by adding a watermarked logo or lower-third ad, and create TV-like experiences for viewers such as tickers and subtitles. The AddOn supports H.263-encoding for live video streams, enabling you to stream to audiences who may be using older mobile devices.

For more information, go to www.wowza.com/products/addons/wowza-transcoder-addon.

Wowza nDVR AddOn

Wowza nDVR (network Digital Video Recorder) AddOn emulates the functionality of a local DVR box on the Wowza server, enabling viewers to experience time-shifted playback on their computers, tablets, smartphones, and TVs.

Wowza nDVR AddOn stores content in a normalized format accessible to Wowza Streaming Engine for any-screen time-shifted playback. The AddOn then delivers the content out over the network in the appropriate streaming format to fulfill individual viewer requests for operations such as time-shifted viewing or instant replays. Compared to client-specific nDVR implementations that store redundant versions of the content for each streaming format, Wowza nDVR AddOn significantly reduces cost by minimizing network storage requirements and simplifying the delivery workflow for all screens. Wowza nDVR AddOn enables Wowza licensees to increase value and viewer engagement by delivering live streams as time-shifted services and providing features such as live pause, rewind, instant replay, and resume.

For more information, go to www.wowza.com/products/addons/wowza-ndvr-addon.

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Wowza DRM AddOn

Wowza DRM AddOn facilitates integration with various digital rights management platforms to deliver on-the-fly encryption for live and video-on-demand content to any screen. Wowza DRM AddOn can help you up-sell content for IPTV and OTT premium services and cross-sell content for multi-device distribution. This premium AddOn provides simultaneous secure key exchange with multiple DRM platforms. Individual live or on-demand content is encrypted on the fly with Microsoft PlayReady or Verimatrix VCAS for delivery via Apple HLS and Microsoft Smooth Streaming to viewers on a wide range of endpoints, including PCs and Macs, set-top boxes, smart TVs, game consoles, smartphones, and tablets. For live workflows, per-stream encryption is available with the ability to rotate keys. For on-demand workflows, per-asset and per-session encryption is available with the ability to rotate keys.

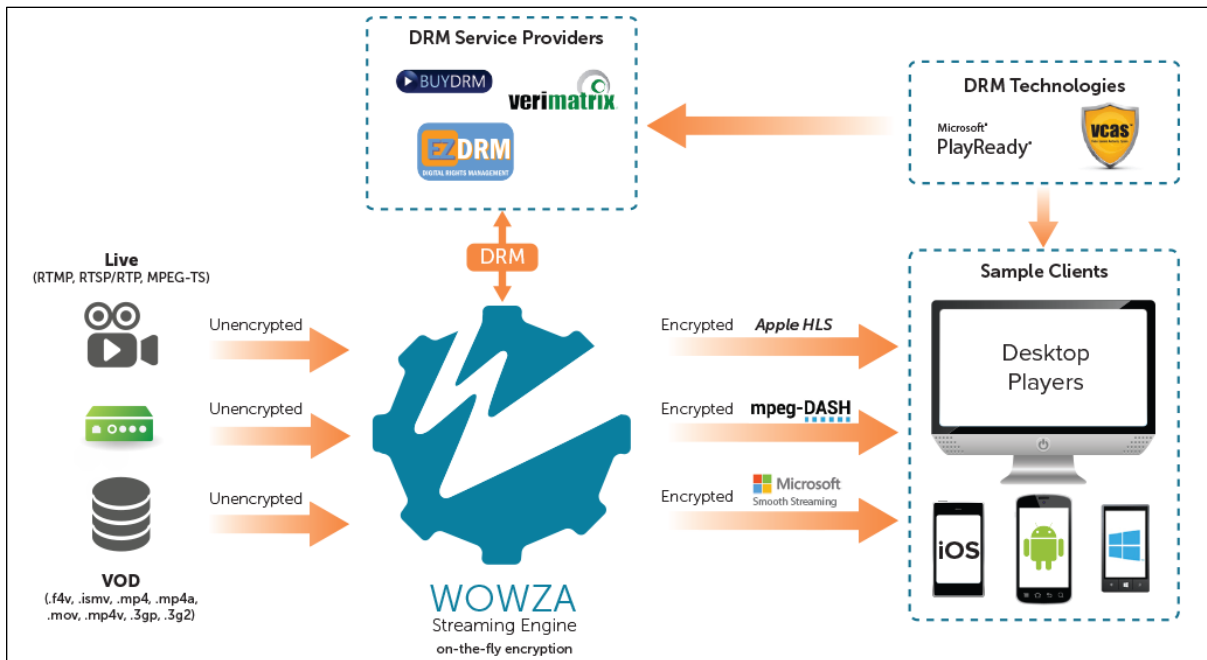*Figure 4. Wowza DRM AddOn encryption methodology*

Wowza DRM AddOn provides integration with the following third-party DRM Key Management Systems, which deliver DRM license keys to Wowza Streaming Engine during encryption and to the viewer's device during playback. This integration offers best-of-breed solutions to Wowza customers who need studio-approved security for delivery of premium content.

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	BuyDRM	**EZDRM**	**Verimatrix**
Key Management Services	Yes	Yes	Yes
Encryption Services	Microsoft® PlayReady®	Microsoft® PlayReady®	Microsoft® PlayReady® Verimatrix® VCAS™
Live Clients	BuyDRM™ Players and Smooth Streaming clients on PCs, Macs, iOS devices, Android devices, Windows phones, game consoles, set-top boxes, and smart TVs	Smooth Streaming clients on PCs, Macs, Windows phones, game consoles, set-top boxes, and smart TVs	ViewRight® Web clients and Smooth Streaming clients on PCs, Macs, iOS devices, Android devices, Windows phones, game consoles, set-top boxes, and smart TVs
On-Demand Clients	Same as Live Clients	Discretix SecurePlayer™ and Smooth Streaming clients on PCs, Macs, iOS devices, Android devices, Windows phones, game consoles, set-top boxes, and smart TVs	Same as Live Clients

Figure 5. Wowza DRM AddOn integration support

For more information, see www.wowza.com/products/addons/DRM.

Free AddOns

In addition to premium AddOns, Wowza offers many free AddOn components that enhance the functionality of Wowza Streaming Engine. The free Wowza StreamLock™ AddOn, for example, provides near-instant provisioning of free 256-bit Secure Sockets Layer (SSL) certificates and greatly simplifies deploying the proven security of SSL to safeguard traditional Flash streams using RTMPS. StreamLock-provisioned certificates provide the best security when used with RTMP, but can also be used for secure HTTP streaming (HTTPS).

Source code and APIs are included with many free AddOn components to enable you to extend and customize functionality to better fit your needs.

For a complete list of AddOns, go to www.wowza.com/products/addons.

Advanced Features

Wowza Streaming Engine is built to deliver infrastructure-grade stability and operational robustness that's well-suited for deployments of all sizes—from the smallest website to the largest CDN.

Cost-Effective Scalability

Cost-effective scalability of server infrastructure for live and VOD content is one of the most important challenges you'll face with increasing demand for streamed content. Wowza Streaming Engine effectively solves this challenge with multi-dimensional scalability:

- Thanks to its full 64-bit multi-threaded capabilities, Wowza Streaming Engine efficiently manages CPU, memory, and disk I/O resources to get the most streaming out of available hardware.

- Wowza Streaming Engine also provides features to scale the capacity for live and VOD content across multiple servers to a virtually unlimited number of concurrent streams.

All of these components, paired with low operating expenses, enable you to scale effectively while enjoying a much lower total cost of ownership.

Efficient Load Balancing

Wowza Streaming Engine can intelligently manage traffic across multiple-server clusters with robust demand-based load balancing to ensure that streams are distributed evenly across servers without overwhelming your infrastructure. To further optimize performance, you can customize specific modules to create a CDN-style redirection of streaming requests to the closest server, based on the users geographic location.

Video on Demand Scalability

With the MediaCache system built in to Wowza Streaming Engine, you can easily scale multiple-server VOD delivery networks. Using MediaCache, which you configure in the Wowza Streaming Engine Manager, each edge server efficiently caches content from the centralized NAS/ASO of HTTP storage to the local disk for immediate playback. Wowza MediaCache eliminates the bottlenecks associated with origin server-based VOD delivery and lets you decide how long to keep content in cache and when to purge it.

Live Streaming Scalability

Wowza Streaming Engine includes Live Stream Repeater (origin/edge) functionality that allows live stream mirroring to multiple edge servers for delivery of streams to virtually unlimited audiences. For added flexibility, any Wowza Streaming Engine node can be configured to act as a Live Stream Repeater (origin) or edge server—or both, giving you maximum utility of the licenses you purchase.

Flexible Administration and Management

In addition to the Wowza Streaming Engine Manager, which lets you create, manage, and monitor your streams, Wowza Streaming Engine offers a flexible, standards based Java Management Extension (JMX) interface that works with a variety of administration consoles and management systems.

JMX is a standards-based technology that exposes Java application components through a unified object interface. This interface can then be consumed by open source and commercial administration consoles such as HP OpenView, Tivoli, IBM Websphere, BEA Weblogic, and many other management platforms.

For simple administration, you can use JConsole, which is available with the Java JDK, to monitor and control your local and remote servers. JConsole captures a wide range of data, giving you a detailed view of server performance; the status of applications, connections, and virtual hosts; bandwidth utilization, and more.

Per-Session Logging for Complete Content Visibility

Content providers and their customers need access to detailed logs to see how their content is performing. This information is used for a variety of business intelligence needs such as billing, ascertaining viewer behavior, and gauging how well specific media assets are received by audiences. Wowza Streaming Engine gives you visibility into your system performance by providing per-session logs for all supported client types. For event logging, Wowza Streaming Engine uses the Java-based Apache log4j logging utility. By default, the server is configured to log basic information to the console window and detailed information to log files, using the W3C Extended Common Log Format (ECLF).

Extensibility with Back-End and Business Systems

Wowza Streaming Engine features a flexible custom module interface (API) that can be used to extend server functionality with custom modules or to integrate the server with backend and other systems for billing, log analysis, content and asset management, or even integrate Wowza Streaming Engine with SIP calling systems and IP PBXs. This can be done directly through Java, Simple Object Access Protocol (SOAP), remote procedure calls (RPC), or the Java Native Interface (JNI).

Compact and Embeddable

Wowza Streaming Engine is implemented to be lightweight and embeddable. Its compact size offers an opportunity to expand the applications for the Wowza Streaming Engine technology beyond the data center by embedding it with other software and hardware products ranging from network appliances, telepresence and video conferencing systems, security systems, carrier-grade delivery platforms, or even consumer devices.

If your company wants to integrate Wowza Streaming Engine streaming capabilities with your hardware or software products, or otherwise partner with Wowza, fill out our Partner Request form at www.wowza.com/contact/partner.

Free Wowza IDE

To simplify and streamline the tasks of extending, configuring, and managing robust implementations of Wowza Streaming Engine, Wowza offers the Wowza Integrated Development Environment (IDE), a free tool that's based on the popular Eclipse™ application framework. Wowza IDE, which is available for the Windows and Mac OS X platforms, provides a rich environment that simplifies Java development tasks. It allows you to easily create, debug, and validate your server-side code before you deploy it. Additionally, Wowza IDE supports the JMX standard for administration management and monitoring.

Deploying Wowza Streaming Engine

This section provides the basic information you'll need to plan your Wowza Streaming Engine deployment on site, in the cloud, or through a CDN.

Deployment Options

The way you deploy Wowza Streaming Engine depends largely on your resources and the scale of your broadcasts.

On-Premises Deployment

If you want to stream small, live events to local audiences, you can easily run Wowza Streaming Engine as a single, onsite origin/edge server, ingesting video directly from an H.264 IP camera and broadcasting directly to supported players. When you deploy Wowza Streaming Engine on-premises, you simply pay for each active instance and can run multiple Wowza instances on multiple computers using a single license key. You don't need to purchase a separate license key for each machine.

Cloud Deployment

When you don't want to manage the operation of the hardware or network, you can deploy Wowza Streaming Engine in the cloud by partnering with a platform SAAS provider for high-quality delivery over a reliable, more robust infrastructure. Cloud hosting:

- Saves you from having to invest in hardware resources and technological infrastructures are your streaming needs grow.

- Allows you to quickly scale up or down as your streaming needs change.

- Lets you rely on the built-in redundancy of the providers' systems.

Wowza Streaming Engine works with virtually all cloud-hosting services, including Amazon Elastic Compute Cloud (Amazon EC2™) and Google Compute Engine.

CDN Deployment

When your audiences expand around the globe, you can deploy Wowza Streaming Engine with a Content Delivery Network (CDN) partner to broadcast your streams using the CDN's widely distributed, edge-networking infrastructure. CDN edge networks are optimized for real-time, globally distributed online applications that require very low latency and high availability—such as live and on-demand video streams. CDNs:

- Have servers and data centers around the world, and stream content from a location closest to the viewer.

- Scale according to load and handle traffic spikes automatically.

- Allow you to get up and running quickly.

Wowza Streaming Engine works with a number of CDN providers, including Akamai, Mirror Image, and Amazon CloudFront.

For more information on deployment options, go to www.wowza.com/products/streaming-engine/deployment-options.

Server Editions

Wowza Streaming Engine is available in several editions. All Wowza Streaming Engine editions are licensed software products and require acceptance of an end user license agreement (EULA) that contains additional details, terms, and conditions. For the most current pricing, volume discounts, and to find out which licensing option is applicable to your specific business, go to www.wowza.com/pricing.html.

The following licensing editions are offered:

- **Wowza Streaming Engine Trial Edition**: This **free** edition provides functionality of Wowza Streaming Engine for 180 days of use from the date of issue, including the Wowza Transcoder AddOn, nDVR AddOn, and DRM AddOn. The trial version is limited to three (3) inbound and ten (10) outbound connections and does not include HTTP Origin functionality. Wowza Transcoder AddOn streams contain audio/video watermarks. Other restrictions apply as described in the Wowza Media Software End User License Agreement (www.wowza.com/docredirect.php?doc=licenseAgreement).

- **Wowza Streaming Engine Monthly Edition:** This edition provides full, unrestricted functionality of Wowza Streaming Engine and AddOns. It's a no-risk, all-inclusive subscription license that's ideal for all applications and all users, including Content Delivery Networks (CDNs), Hosting and Streaming Service Providers. The Monthly Edition requires no up-front investment or long-term commitment, and you pay monthly for the server instances and AddOns that you use. You can cancel at any time. A single license key permits the use of an unlimited number of server instances and AddOns. The Monthly Edition is also valid for use on Amazon Elastic Compute Cloud (Amazon EC2) and other cloud computing environments and includes maintenance and support.

- **Wowza Streaming Engine Perpetual Edition**: This edition provides full, unrestricted functionality of Wowza Streaming Engine, but requires separate license keys for each server. In addition, each premium AddOn is licensed separately. Wowza nDVR AddOn and Wowza DRM AddOn licenses provide unlimited connection capacity per instance. Each Wowza nDVR AddOn and Wowza DRM AddOn license must be used with a Wowza Streaming Engine Perpetual Edition license. Each Wowza Transcoder AddOn license is limited to one incoming channel (stream) and an unlimited number of outbound streams per the Wowza Streaming Engine Perpetual Edition license. Multiple Wowza Transcoder AddOn licenses can be stacked on a single Wowza Streaming Engine Perpetual Edition license for additional channel capacity. Full version upgrades may be charged an additional upgrade fee. Includes one (1) year of maintenance and support. **Not valid for use by Service Providers.** For more detailed information, contact sales@wowza.com.

- **Wowza Streaming Engine Developer Edition**: This free edition is offered for long-term use by developers. The Developer Edition provides full, unrestricted functionality of Wowza Streaming Engine and AddOns, but is limited to 180 days of use from the date of issue, and is further limited to ten (10) concurrent connections with live streaming restricted to two (2) inbound and ten (10) total combined concurrent inbound and outbound streams. Wowza Transcoder streams contain audio/video watermarks.

Note: Although the Wowza Streaming Engine Monthly and Perpetual editions don't limit the number of connections, connection capacity depends on your choice of physical or virtual server and specific applications.

Operating System Support

Wowza Streaming Engine can be deployed on any platform that supports the Java Runtime Environment (JRE). For best performance, we recommend a 64-bit operating system and a corresponding 64-bit Java runtime. To simplify deployment, Wowza Streaming Engine downloadable installation packages are available for:

- Windows

- Mac OS X

- Linux RPM (Red Hat Package Manager)

- Linux DEB (Debian Package Manager)

- Linux/Solaris (Straight install using the **tar** command)

On the Windows and Mac OS® X platforms, Wowza Streaming Engine is installed using an installer. On Linux®, Solaris®, and other Unix®-based platforms, the software is installed using a self-extracting binary installer. Each installer includes the server and premium AddOn software. Wowza Transcoder AddOn will work only on 64-bit versions of the Windows or Linux operating system. To download a Wowza Streaming Engine installer for your specific OS, go to www.wowza.com/pricing/installer.

Installation Prerequisites

Because Wowza Streaming Engine is a Java™ application, JRE version 6 (or later) must be installed in order to run. Install the most recent version of the JRE available for your platform, and be sure to select the 64-bit Java installer if you're running a 64-bit operating system. Download the free JRE from www.oracle.com/technetwork/java/javase/downloads/index.html.

Server Specifications

In VOD applications, much of Wowza Streaming Engine's performance is driven by the underlying system's I/O performance and is limited by how fast the hardware can deliver the streamed file bits from the disk. To get the most throughput from your hardware, we suggest that you use RAID 0 or RAID 10 configurations with as many drives as possible in the RAID array.

For production servers, the minimum configuration we recommend is a single quad-core CPU with at least 1 GB of RAM per core, a dual disk in a RAID 0 (striping) configuration, and a 1 Gbps Ethernet interface.

Wowza Streaming Engine has no per-server limits on the number of CPU cores. This means that you can take full advantage of highly-threaded multi-core hardware for even higher streaming efficiency and cost-effectiveness.

When using Wowza Transcoder AddOn, we highly recommend that you use Intel Quick Sync Video, NVIDIA NVENC, or NVIDIA CUDA hardware acceleration.

To see a Wowza Streaming Engine specifications summary, go to http://www.wowza.com/media-server/specifications.

Optimizing Performance

The performance of Wowza Streaming Engine depends on the hardware you select and the applications that you run. For example, on any given hardware configuration, connection capacity for video chat or live streaming applications will likely be higher than connection capacity for video on demand applications because disk I/O is less of a factor for video chats or live streaming.

On standard servers with dual quad-core processors and multiple NICs, you can typically achieve up to 5 Gbps of streaming performance if the server is properly tuned. Wowza Streaming Engine has demonstrated the capability to deliver up to 10 Gbps of streaming throughput for both live and on-demand content on multi-threaded, multi-CPU computers that are finely tuned at the kernel level. To optimize Wowza Streaming Engine software performance on production hardware, we provide a set of suggested general tuning instructions at www.wowza.com/forums/content.php?5-general-tuning.

We also offer a free Flash RTMP Load Test Tool to help you benchmark Wowza Streaming Engine software performance on the hardware of your choice. For more information, go to www.wowza.com/forums/content.php?122-How-to-get-Flash-RTMP-Load-Test-Tool.

Summary

The demand for streaming audio and video is growing exponentially, fueled by audiences that expect high-quality, broadcast-like experiences and the ability to stream to PCs, mobile devices, smart TVs, and other devices whenever and wherever they want. For organizations that provide content, that means supporting an ever-increasing number of protocols, formats, and playback devices. You have to create video streams that adapt to changing network conditions, minimize storage requirements, maximize performance of existing hardware, and meet other technical challenges—all while keeping costs in check.

Wowza Streaming Engine addresses these challenges by providing robust, customizable, and scalable server software that powers reliable streaming of high-quality video and audio to any device, anywhere. Get Wowza Streaming Engine at www.wowza.com/pricing or go to www.wowza.com/partners to contact one of our Wowza Streaming Partners and start streaming content with confidence and control.

Resources

For the most up-to-date information about Wowza Streaming Engine, go to www.wowza.com.

For technical questions, go to the Wowza forums at www.wowza.com/forums or send an email to support@wowzamedia.com.

Wowza Streaming Engine documentation is available at www.wowza.com/resources.html.

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