Wowza Streaming Engine™

User Guide
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## Document History

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<tr>
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</tr>
</tbody>
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### Note

A more recent version of this document may be available online. See [Wowza Streaming Engine product articles](https://www.wowza.com) for the latest content.
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What's New

What's new in Wowza Streaming Engine?

Wowza Streaming Engine™ is robust, customizable, and scalable media server software that powers reliable streaming of high-quality audio and video to any device, anywhere.

Wowza Streaming Engine 4.7.7 contains several fixes and enhancements that help to improve the functionality of the media server.

Support for WebRTC

WebRTC is an open-source real-time communication project. In earlier versions of Wowza Streaming Engine, WebRTC support was considered a preview feature and had limited functionality. With Wowza Streaming Engine 4.7.7 and later, WebRTC is fully supported and includes significant enhancements to the preview functionality. For more information, see Set up WebRTC streaming with Wowza Streaming Engine.

nDVR enhancements for MPEG-DASH

Wowza Streaming Engine 4.7.7 provides a variety of fixes and performance improvements for nDVR support of MPEG-DASH. For more information, see Get started with Wowza nDVR.
Introduction

What is Wowza Streaming Engine?

Wowza Streaming Engine is high-performance, extensible, and fully interactive media streaming software platform that provides live and on-demand streaming, chat, and remote recording capabilities to a wide variety of media player technologies. Wowza Streaming Engine can deliver content to many popular media players such as Adobe Flash Player; Microsoft Silverlight player; to Apple iOS devices and Apple QuickTime player (version 10 or later); to Android devices; and to IPTV/OTT set-top boxes. Wowza Streaming Engine supports many streaming protocols including Adobe HTTP Dynamic Streaming (Adobe HDS), Apple HTTP Live Streaming (Apple HLS), Microsoft Smooth Streaming, MPEG-DASH streaming, MPEG-2 Transport Streams (MPEG-TS), Web Real-time Communication (WebRTC), Real Time Messaging Protocol (RTMP), Real Time Streaming Protocol (RTSP), and Real-time Transport Protocol (RTP).

For the most up-to-date documentation, see all of our Wowza Streaming Engine articles.

Adobe HDS (Adobe Flash Player)

Wowza Streaming Engine software can stream adaptive bitrate live and video-on-demand (VOD) content to Adobe Flash Player 10.1 or later using the Adobe HTTP Dynamic Streaming (Adobe HDS) protocol. Adobe HDS is a chunk-based streaming protocol that uses HTTP for delivery. All media-chunking and packaging necessary to deliver a stream using this protocol is performed by Wowza Streaming Engine. Adobe HDS is referred to as "San Jose" streaming in the Wowza Streaming Engine configuration files.

When streaming VOD content, Wowza Streaming Engine software supports MP4 files (QuickTime container) and MP3 files. FLV files are supported for RTMP playback.
Streaming Engine supports the following video and audio codecs when using the Adobe HDS protocol:

**Video**
- H.264
- On2 VP6 (live only)
- Screen video and Screen video 2 (live only)
- Sorenson Spark (live only)

**Audio**
- AAC, AAC Low Complexity (AAC LC), AAC High Efficiency (HE-AAC) v1 and v2
- MP3
- Speex (live only)

**Apple HLS (iOS devices, QuickTime, and more)**
Wowza Streaming Engine can stream adaptive bitrate live and VOD H.264, AAC, and MP3 content to iOS-based devices (iPhone/iPad/iPod touch iOS version 3.0 or later), QuickTime player (version 10 or later), Safari browser (version 4.0 or later), and other devices such as the Roku and Amino set-top boxes and some brands of smart TVs using the Apple HTTP Live Streaming (Apple HLS) protocol. Apple HLS is a chunk-based streaming protocol that uses HTTP for delivery. All media-chunking and packaging necessary to deliver a stream using this protocol is performed by Wowza Streaming Engine. Apple HLS is referred to as "Cupertino" streaming in the Wowza Streaming Engine configuration files.


Wowza Streaming Engine can send timed data events to the iOS player in the form of ID3 tags. See [Convert timed metadata from AMF to ID3 using the Wowza Streaming Engine Java API](https://wowza.com/docs/wowza-streaming-engine-4.7-user-guide#convert-timed-metadata-from-amf-to-id3-using-the-wowza-streaming-engine-java-api).

Wowza Streaming Engine populates the playlist file with metadata that describes each of the available streams in an adaptive bitrate presentation. This enables iOS-based players to intelligently select the appropriate streams based on hardware device capabilities.

The iPhone, iPad, and iPod touch (iOS devices) and Apple TV digital media extender support the following media formats:
**Video**
- H.264

**Audio**
- 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

**Microsoft Smooth Streaming (Microsoft Silverlight and more)**

Wowza Streaming Engine can stream adaptive bitrate live and VOD H.264, AAC, and MP3 content to Microsoft Silverlight, Windows Phone devices, and other devices using the Microsoft Smooth Streaming protocol. Microsoft Silverlight 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. All media chunking and packaging necessary to deliver a stream using this protocol is performed by the Wowza Streaming Engine server so there’s no need for an IIS web server.

The following media formats can be used when streaming to Smooth Streaming clients:

**Video**
- H.264

**Audio**
- AAC, AAC Low Complexity (AAC LC), AAC High Efficiency (HE-AAC) v1 and v2
- MP3

**MPEG-DASH streaming (DASH clients)**

Dynamic Adaptive Streaming over HTTP (DASH), also known as MPEG-DASH, is an international standard for adaptive streaming that's being adopted by the streaming industry. Wowza Streaming Engine includes MPEG-DASH technology for streaming live and VOD content over HTTP to select DASH clients.

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 necessary to deliver a stream using this technology is performed by Wowza Streaming Engine. Note that in MPEG-DASH terminology, chunks are called segments.

MPEG-DASH servers give DASH clients a list of the available media chunk URLs in a Media Presentation Description (MPD) manifest. The MPD describes chunk information such as timing, language, timed text, and media characteristics (video resolution and bitrate). Clients request media chunks sequentially based on network conditions, device capabilities, and other factors to enable uninterrupted playback of the adaptive bitrate media presentation.

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.

The following media formats can be used when streaming to DASH clients:

**Video**

- H.264
- VP8
- VP9

**Audio**

- 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)
- Vorbis
- Opus

For more information about MPEG-DASH support in Wowza Streaming Engine, see Stream over MPEG-DASH with Wowza Streaming Engine.

**WebRTC (browser players)**

Wowza Streaming Engine can stream live and VOD content to browser players that support WebRTC streams. WebRTC is an open-source project designed to provide browsers and mobile applications with real-time communication capabilities.
Wowza Streaming Engine supports the following video and audio codecs when using this streaming protocol:

**Video**
- VP8
- VP9
- H.264

**Audio**
- Opus
- Vorbis
- PCMU
- PCMA

**Adobe RTMP (Adobe Flash Player)**
Wowza Streaming Engine communicates with Adobe Flash Player using the Real Time Messaging Protocol (RTMP). Wowza Streaming Engine can deliver adaptive bitrate live and VOD content to Flash Player using RTMP and it supports other features such as shared objects, video recording, video chat, remote procedure calls, and more. Wowza Streaming Engine supports all video and audio formats that Flash Player supports:

**Video**
- H.264
- On2 VP6
- Sorenson Spark
- Screen video and Screen video 2

**Audio**
- AAC, AAC Low Complexity (AAC LC), AAC High Efficiency (HE-AAC) v1 and v2
- MP3
- Speex

Wowza Streaming Engine software supports the following RTMP protocol variants:
• RTMP – The base protocol and the most efficient and fastest of the variants.

• RTMPE – A lightweight encryption variant that helps to secure the data being transmitted between Wowza Streaming Engine and Flash Player.

• RTMPS – An encryption variant that transmits data over a secure SSL connection. RTMPS uses a more robust encryption layer than RTMPE to wrap the RTMP session. Users with Subscription and Perpetual licenses for Wowza Streaming Engine software can use Wowza StreamLock™ AddOn to get free 256-bit SSL certificates for use with RTMP (RTMPS) and HTTP (HTTPS).

• RTMPT – A tunneling variant that is used to tunnel through firewalls that employ stateful packet inspection.

• RTMPTE – An encryption variant of the RTMPT protocol.

Wowza Streaming Engine includes bi-directional support for Action Message Format (AMF3 and AMF0) for data serialization (AMF3 was introduced in Flash Player 9 and ActionScript 3.0).

**RTSP/RTP (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-2 TS). This includes players and devices such as QuickTime player (version 10 or later), VideoLAN VLC player, set-top boxes, and 3GPP devices. Wowza Streaming Engine can also accept source streams from encoding devices that use these protocols, and supports RTP and MPEG-2 TS input and output over UDP as well as multicast. In addition, Wowza Streaming Engine supports interleaved RTSP/RTP (RTP over the RTSP TCP connection) and RTSP/RTP tunneling (RTSP/RTP over HTTP), which enables RTSP/RTP to be delivered in network environments that don’t allow UDP transmission.

Wowza Streaming Engine supports the following RTSP, RTP, and MPEG specifications:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPEG-TS</td>
<td>ISO/IEC 13818-1</td>
</tr>
<tr>
<td>MPEG-TS over RTP</td>
<td>rfc2038</td>
</tr>
<tr>
<td>RTP: AAC</td>
<td>rfc3640, rfc3016, ISO/IEC 14496-3</td>
</tr>
<tr>
<td>RTP: G.711</td>
<td>rfc3551</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Protocol</th>
<th>RFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTP: H.263</td>
<td>rfc2429</td>
</tr>
<tr>
<td>RTP: H.264</td>
<td>rfc3984, QuickTime Generic RTP Payload Format</td>
</tr>
<tr>
<td>RTP: MP3</td>
<td>rfc2250</td>
</tr>
<tr>
<td>RTP: MPEG-2 (video)</td>
<td>rfc2250</td>
</tr>
<tr>
<td>RTP: MPEG-4 Part 2</td>
<td>rfc3106</td>
</tr>
<tr>
<td>RTP: Speex</td>
<td>rfc5574</td>
</tr>
<tr>
<td>RTSP</td>
<td>rfc2326</td>
</tr>
</tbody>
</table>

Wowza Streaming Engine supports both Single Program (SPTS) and Multi Program (MPTS) MPEG-TS streams and enables you to specify a specific program, a specific language, and a specific audio or video track in an MPTS stream.

Query parameters are part of the udp:// URL in a .stream file. There are four options for selecting a stream. For more information about how to use the query parameters, see [Specify per-stream settings in Wowza Streaming Engine .stream files](#).

### Video and audio streaming, recording, and chat

Wowza Streaming Engine can stream live and VOD content to many player technologies. It supports the following VOD file formats: MP4 (QuickTime container - .mp4, .f4v, .mov, .m4a, .m4v, .mp4a, .mp4v, .3gp, and .3g2), FLV (Flash Video - .flv), and MP3 content (.mp3). Wowza Streaming Engine can accept live video and audio streams from sources that support the RTMP, RTSP/RTP, native RTP, and MPEG-TS protocols and it can record any live source stream to either the MP4 or FLV format.

Wowza Streaming Engine can read and write Action Message Format (AMF0 and AMF3) data events to and from MP4 files. In addition, it supports MP4 multi-language caption and audio tracks.

Wowza Streaming Engine can be used 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 to supported player technologies. It maintains a single connection to the original source stream while delivering the stream to multiple players. It can also forward embedded SHOUTcast and Icecast metadata, such as song title and artist, to Adobe Flash Player. The SHOUTcast example that's included with the Wowza Streaming Engine installation illustrates these capabilities.
Wowza Streaming Engine can deliver two-way video, audio, and text chat to Adobe Flash Player. This feature can be leveraged to deliver video conferencing applications or two-way messaging applications.

**Live stream transcoding and transrating**

The Transcoder feature in Wowza Streaming Engine is a real-time video transcoding and transrating solution that provides the ability to ingest a live stream, decode the video and audio, and then re-encode the stream for delivery to desired playback devices. It can decode and re-encode audio and video in multiple formats with key frames that are properly aligned for adaptive bitrate delivery. The following are some common scenarios:

- **Transcode** – Ingest a non-H.264/VP8/VP9 video and non-AAC/MP3/Vorbis/Opus audio stream and convert it to a set of H.263, H.264, VP8, or VP9 video and AAC, Vorbis, or Opus audio renditions that have aligned key frames for adaptive bitrate streaming.

- **Transrate** – Ingest an H.264 video and AAC/MP3 audio stream and create a full set of bitrate renditions that have key frames aligned to the source stream for adaptive bitrate streaming.

- **Audio-only** – Ingest an H.264 video and Speex audio stream from Adobe Flash Player and convert the Speex audio format to AAC, Vorbis, or Opus to make the stream compatible with additional player technologies.

**Video and audio codecs**

Wowza Transcoder supports the following video and audio codecs:

<table>
<thead>
<tr>
<th>Video (decoding)</th>
<th>Video (encoding)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.264</td>
<td>H.263v2</td>
</tr>
<tr>
<td>MPEG-2</td>
<td>H.264</td>
</tr>
<tr>
<td>MPEG-4 Part 2</td>
<td>VP8</td>
</tr>
<tr>
<td>VP8</td>
<td>VP9</td>
</tr>
<tr>
<td>VP9</td>
<td>* H.265</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Audio (decoding)</th>
<th>Audio (encoding)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAC</td>
<td>AAC</td>
</tr>
<tr>
<td>G.711 (µ-law and A-law)</td>
<td>Vorbis</td>
</tr>
</tbody>
</table>
MPEG-1 Layer 1/2
MPEG-1 Layer 3 (MP3)
Speex
Vorbis
Opus

* = Preview Transcoder Technology

Transcoder support for the H.265 codec is provided as an early feature preview of software that may be updated in a later release of Wowza Streaming Engine. Unexpected results can occur when using feature preview software. To get the best results when using this codec, see the following resources:

- To use the H.265 video codec, follow the instructions in Stream using HEVC/H.265 with Wowza Transcoder.
- You can't use Wowza Streaming Engine Manager to specify that the H.265 codec be used for your transcoded output renditions. Instead, you must edit your Transcoder template files in a text editor. For details, see the XML reference in “Set up and run Wowza Transcoder in Wowza Streaming Engine.”

Hardware acceleration

Wowza Transcoder can be configured to take advantage of hardware acceleration on 64-bit Windows and Linux operating systems, which is recommended but not required. If your configuration doesn't include hardware acceleration, a built-in software encoder is invoked.

Wowza Transcoder can be configured to take advantage of the following hardware acceleration technologies:

- **Intel Quick Sync Video** (for both accelerated video decoding and encoding) – For recommended workstation and server-level hardware specifications, and links to configuration instructions, see Server specifications for Intel Quick Sync acceleration with Wowza Transcoder.
- **NVIDIA NVENC** (for accelerated video encoding only) and **NVIDIA CUDA/NVCUVID** (for accelerated video decoding only). For a list of supported NVIDIA graphics cards that are compatible with the Transcoder, and links to configuration instructions, see Server specifications for NVIDIA NVENC and NVIDIA CUDA acceleration with Wowza Transcoder.

**Note**

This release of Wowza Streaming Engine has support for encoding H.265/HEVC video renditions using the NVIDIA NVENC hardware acceleration encoding option. This is a technology preview feature that may be updated in a later release of the software.
Overlays

You can apply static GIF, JPEG, PNG, and BMP overlay images to streams and customize the location, size, alignment, and opacity of the image to achieve stationary image effects such as a watermark to your video. In addition, you can use a Java-based API to apply dynamic overlay images to streams. The API can be configured manually or pre-programmed based on external events, making it a powerful tool for adding premium TV-like experiences. See Add graphic overlays to live streams with Wowza Transcoder.

For more information about the Transcoder feature, see About Wowza Transcoder and the Wowza Transcoder community forum.

Live stream DVR playback

The nDVR feature in Wowza Streaming Engine provides the ability to record a live stream into a cache on the server. This enables viewers that join the live stream in-progress to access the cache to rewind to the beginning of the live stream (or rewind within the part of the stream that you specify) and then use DVR playback controls in their player to watch the stream from that point forward. Configuration for client playback of recorded streams is similar to playback of live streams from Wowza Streaming Engine.

For more information about the nDVR feature, see About live stream nDVR and the Wowza nDVR community forum.

Stream encryption with DRM

The DRM feature in Wowza Streaming Engine software provides integration with third-party digital rights management (DRM) key management service partners to enable on-the-fly encryption of premium live and VOD content for a variety of playback devices. For live workflows, per-stream encryption is available with the ability to rotate keys. For VOD workflows, per-asset and per-session encryption is available with the ability to rotate keys. Both live and VOD key rotation support is available for Apple HTTP Live Streaming (HLS).

Integration is supported for the following Key Management Service providers:

- **BuyDRM KeyOS** – Provides Microsoft PlayReady encryption services for MPEG-DASH, Apple HLS, and Microsoft Smooth Streaming and playback with BuyDRM players and Smooth Streaming clients on PCs, Macs, iOS devices, Android devices, Windows phones, game consoles, set-top boxes, and smart TVs.

- **EZDRM** – Provides Microsoft PlayReady encryption services for Smooth Streaming playback with Smooth Streaming clients on PCs, Macs, Windows phones, game
consoles, set-top boxes, and smart TVs and with Discretix SecurePlayer media players on Android and iOS devices.

- **Verimatrix** – Provides Verimatrix VCAS and Microsoft PlayReady encryption services for HLS and Smooth Streaming playback with Verimatrix ViewRight and Smooth Streaming clients on PCs, Macs, iOS and Android devices, Windows phones, game consoles, set-top boxes, and smart TVs.

For more information about the DRM feature, see [About digital rights management and Wowza Streaming Engine](#) and the [Wowza DRM community forum](#).
Note

Wowza Streaming Engine has APIs that enable encryption schemes for on-the-fly encryption of live and VOD Apple HLS streams, including **SAMPLE-AES** (sample-level encryption for version 5 of the Apple HLS streaming protocol), **ENVELOPE-PLAYREADY** (supported by BuyDRM player technology with PlayReady DRM) and **CHUNK-PLAYREADY** (supported by INSIDE Secure player technology with PlayReady DRM). Wowza Streaming Engine also has an API that enables on-the-fly encryption of live and VOD Microsoft Smooth Streaming format with PlayReady protection for INSIDE Secure player technology. The DRM feature in Wowza Streaming Engine isn’t required to use these APIs. For more information, see Secure Apple HLS streaming using DRM encryption with Wowza Streaming Engine.

AddOns

Wowza™ provides the following AddOn packages that you can download and install to extend and enhance Wowza Streaming Engine server functionality.

<table>
<thead>
<tr>
<th>AddOn Package</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Balancing</td>
<td>The Dynamic Load Balancing AddOn enables you to dynamically distribute HTTP, RTMP, and RTSP streams across multiple Wowza Streaming Engine edge servers. The edge servers communicate with one or more Wowza Streaming Engine load balancers, and clients connect to the load-balancing server to get the least-loaded edge server. See Get the Dynamic Load Balancing AddOn for Wowza Streaming Engine.</td>
</tr>
<tr>
<td>Central Configuration</td>
<td>The Central Configuration AddOn provides a system for managing multiple Wowza Streaming Engine servers in a complex environment from a central location. You can modify the system to fit most CDN and service provider environments. See Get the Central Configuration AddOn for Wowza Streaming Engine.</td>
</tr>
</tbody>
</table>
### Network Security
The Wowza StreamLock AddOn is a security option for network encryption that provides near-instant provisioning of free 256-bit Secure Sockets Layer (SSL) certificates to verified Wowza users for use with Wowza Streaming Engine. StreamLock-provisioned SSL certificates provide the best security when used with RTMP. The certificates can also be used for secure HTTP streaming (HTTPS). Certificates expire after one year. See [Get SSL certificates from the Wowza Streaming Engine StreamLock service](#).

### GeoIP Locking
The GeoIP AddOn enables you to restrict access to streamed content based on a client’s geographic location. See [Enable geographic locking (ModuleGeoIPLock)](#).

### Stream Name Aliasing
The StreamNameAlias AddOn enables you to simplify complex URL-based stream names with aliases, provide security to limit the valid stream names used, or map one stream name to another. See [Get the StreamNameAlias AddOn for Wowza Streaming Engine](#).

### Load Testing
You can use the Wowza Load Test Tool to generate load on a single Wowza Streaming Engine instance to test configuration and performance of RTMP and Apple HLS streaming. The Load Test Tool requires a Subscription or Perpetual license for Wowza Streaming Engine. See [Get the Wowza Load Test Tool for Wowza Streaming Engine](#).

### Module Collection
The Wowza Module Collection is a collection of ready-to-use modules and utilities that provide specific functionality for Wowza Streaming Engine applications. The modules in the collection are compiled, so Java experience isn't required. See [Module examples](#).

**Note**
For an up-to-date list of the AddOn packages and information about how to use them, see [Wowza Streaming Engine AddOns](#).
### Installed examples

Wowza Streaming Engine includes the following examples that highlight the server functionality. They’re located in `[install-dir]/examples`. The `[install-dir]/examples/README.html` file describes the available examples and how to install them.

<table>
<thead>
<tr>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VideoOnDemandStreaming</td>
<td>This example shows how to configure and play VOD content. It includes sample players for Apple iOS devices, Adobe Flash, Microsoft Silverlight, and DASH clients and source code for an OSMF-based Flash Player and Microsoft Silverlight 3 or later. It uses the <code>default</code> stream type.</td>
</tr>
<tr>
<td>LiveVideoStreaming</td>
<td>This example shows how to configure and play live video. It includes sample players for iOS devices, Adobe Flash, Microsoft Silverlight, and DASH clients and source code for an OSMF-based Flash Player and Microsoft Silverlight 3 or later. It uses the <code>live</code> stream type.</td>
</tr>
<tr>
<td>LiveDVRStreaming</td>
<td>This example shows how to configure the nDVR feature in Wowza Streaming Engine to record and play a live video with DVR. It includes sample players for Adobe Flash and Microsoft Silverlight and source code for Microsoft Silverlight 3 or later. It uses the <code>live</code> stream type.</td>
</tr>
<tr>
<td>SHOUTcast</td>
<td>This Adobe Flash example shows how to re-stream SHOUTcast MP3 or AAC+ audio data through Wowza Streaming Engine. It uses the <code>shoutcast</code> stream type.</td>
</tr>
<tr>
<td>VideoChat</td>
<td>This Adobe Flash example shows how to implement video chat between two users. It uses the <code>live-lowlatency</code> stream type for RTMP and the <code>Camera</code> and <code>Microphone</code> objects to get video and audio content. The example can stream video and audio data between two client connections or loop the data back to itself.</td>
</tr>
</tbody>
</table>
We are recording

This Adobe Flash example shows how to implement the advanced client-to-server video-recording capabilities in Wowza Streaming Engine using Adobe Flash Player. It uses the record stream type and the Camera and Microphone objects to get video and audio content. To use this example, you'll need a web camera (webcam) and Adobe Flash running in a web browser.

Developers can use this example with the Wowza Integrated Development Environment (Wowza IDE) to learn how to create custom server-side modules. The example contains server-side module class files and Flash client applications that demonstrate how Wowza Streaming Engine interacts with Flash clients.

Notes

- All Adobe Flash examples are implemented using ActionScript 3.0.
- Stream types are used to control the different types of streaming (live, VOD, chat, remote recording, and so on.) See Stream types.

Wowza Streaming Engine editions

Subscription and Perpetual (lifetime) licenses are available for use with Wowza Streaming Engine to accommodate nearly any use case or business need. See Wowza Streaming Engine Pricing.
Server Installation

How do I install Wowza Streaming Engine?

This chapter describes how to install and run Wowza Streaming Engine. Wowza Streaming Engine software automatically installs a version of Java that it requires, making it easy to get Wowza Streaming Engine up and running.

Note

Wowza Streaming Engine is built on and supports Java 8. Earlier versions of Java are not supported. The version of Java that installs with the software is required for using Wowza Streaming Engine Manager. For optimal performance and stability, we recommend using the version of Java that installs by default. If you can’t or don’t want to use the version of Java that installs with Wowza Streaming Engine and you don’t use Wowza Streaming Engine Manager, you can use Java 8 Update 91 (8u91) or later. For more information, see Manually install and troubleshoot Java on Wowza Streaming Engine.

Before installation

If you're upgrading your Wowza Media Server™ software (version 3.6 or earlier) to Wowza Streaming Engine, you must uninstall Wowza Media Server before installing Wowza Streaming Engine. For instructions, see Upgrade from Wowza Media Server to Wowza Streaming Engine.

If you're updating from an earlier version of Wowza Streaming Engine, don’t run the installer. Instead, run the updater. For instructions, see Update your Wowza Streaming Engine installation.
Installing Wowza Streaming Engine

Wowza Streaming Engine is installed using an install wizard on Windows, OS X, and Linux platforms. The installer creates a new, clean instance of the Wowza Streaming Engine on the computer where it's installed.

1. Go to the Wowza Downloads webpage and click Download for the installer for your desired operating system.

2. When the download completes, do one of the following:

   - **Windows** – Double-click the installer file, WowzaStreamingEngine-4.7.7-windows-installer.exe, and follow the wizard instructions.
   
   - **OS X** – Double-click the disc image file, WowzaStreamingEngine-4.7.7-osx-installer.dmg, and then double-click the installer package icon, WowzaStreaming Engine-4.7.7-osx-installer, and follow the wizard instructions.
   
   - **Linux** – In the folder where you downloaded the Linux package, run the commands below. Then, follow the wizard instructions.
     
     ```
     sudo chmod +x WowzaStreamingEngine-4.7.7-linux-x64-installer.run
     sudo ./WowzaStreamingEngine-4.7.7-linux-x64-installer.run
     ```

During the installation process, you'll be asked:

- To accept the terms of the license agreement.

- To enter a valid license key. If you acquired a new license key, you'll find it in the email that you received from Wowza Sales. If you have a previous version of Wowza Streaming Engine installed, you may be able to use the license key value found in the `[install-dir]/conf/Server.license` file.

- To create a user name and password for an Administrator account. You'll use this account to sign in to the browser-based Wowza Streaming Engine Manager. The user name and password values are case-sensitive.

- To confirm or change the install location. By default, Wowza Streaming Engine installs in the following directories:

  - **Windows** – /Program Files (x86)/Wowza Media Systems/Wowza Streaming Engine 4.7.7/
• **OS X** –
  - /Applications/Wowza Streaming Engine 4.7.7/
  - /Library/LaunchDaemons/
  - /Library/WowzaStreamingEngine/ (an alias)
  - /Library/WowzaStreamingEngine-4.7.7/
• **Linux** – /usr/local/WowzaStreamingEngine-4.7.7/ (as the root user)

  If you want to start Wowza Streaming Engine and Wowza Streaming Engine Manager automatically after the installation finishes, accept the default option **Start Wowza Streaming Engine automatically**. This option configures the server and manager software to start automatically as system services. If you don’t choose this option, you must start the software and the manager manually before you can use the software. See **Starting and stopping the software** and **Starting and stopping Wowza Streaming Engine Manager**.

---

**Note**

A silent installation option is available for all platforms, including Red Hat Package Manager and Debian Package Manager options for Linux. Approval is required to activate this option. For information, contact sales@wowza.com.

---

**Starting and stopping the software**

Wowza Streaming Engine and Wowza Streaming Engine Manager can run as system services or in standalone mode.

System services start automatically when you start the computer and remain on until you turn them off. By default, Wowza Streaming Engine and Wowza Streaming Engine Manager install as system services, which means you're running an active instance of Wowza Streaming Engine from the moment of install and any time the host computer is on.

Standalone mode operates independently of the operating system; you start and stop the software on demand. As with any standalone software, if you forget or fail to quit the program, you're prompted to do so when you turn off the computer. Standalone mode is required for running Wowza Transcoder with accelerated hardware in Windows. It's also useful in testing environments because you can see log output in the console immediately.

You can, however, manually start and stop Wowza Streaming Engine at any time, in either operational mode. For example, Subscription license holders might want to turn off the
software as a service to avoid being charged for inactive instances of Wowza Streaming Engine.

**Note**

Wowza Streaming Engine can’t run as a service and in standalone mode at the same time.

Start and stop Wowza Streaming Engine as a service (Windows)

To start the Wowza Streaming Engine service:

1. Press Win key + R, type `services.msc` in the **Run** dialog box, and then click **OK**.
2. In the **Services** window, right-click **Wowza Streaming Engine 4.7.7** and then click **Start**.

To stop the service:

1. Press Win key + R, type `services.msc` in the **Run** dialog box, and then click **OK**.
2. In the **Services** window, right-click **Wowza Streaming Engine 4.7.7** and then click **Stop**.

Wowza Streaming Engine can be set to start automatically as a Windows service when Windows starts. To prevent the service from starting automatically when Windows starts:

1. Press WIN key + R, type `services.msc` in the **Run** dialog box, and then click **OK**.
2. In the **Services** window, right-click **Wowza Streaming Engine 4.7.7**, and then click **Properties**.
3. In the **Properties** dialog box, on the **General** tab, set **Startup type** to **Manual**.

Start and stop Wowza Streaming Engine in standalone mode (Windows)

To start Wowza Streaming Engine in standalone mode, make sure that the Wowza Streaming Engine service is stopped (see above), and then do the following:

1. Press WIN key + R, type `cmd` in the **Run** dialog box, and then press Enter.
2. In the Command Prompt window, execute the following commands:

   ```
   cd %WMSAPP_HOME%\bin
   startup.bat
   ```

To stop the software:

1. Press WIN key + R, type `cmd` in the **Run** dialog box, and then press **Enter**.
2. In the Command Prompt window, execute the following commands:

```
cd %WMSAPP_HOME%\bin
shutdown.bat
```

**Notes**

- The Wowza Streaming Engine 4.7.7 service runs under the Local System account by default. This can limit how Wowza Streaming Engine interacts with the underlying operating system. For example, you may have issues streaming content from UNC paths. To address this issue, update the service to run as a named user. To do this, right-click the service name in the Services window, click Properties, and then on the Log On tab specify an alternate user account that the service can use to log on under This account.

- The hardware acceleration used by Wowza Transcoder is only available when running Wowza Streaming Engine as a Windows standalone application. It's not available when Wowza Streaming Engine is invoked as a service.

### Start and stop Wowza Streaming Engine as a service (OS X)

To start the service, double-click the Start Services application in `/Applications/WowzaStreamingEngine-4.7.7` or open a Terminal window and enter the following command:

```
sudo launchctl load -w /Library/LaunchDaemons/com.wowza.WowzaStreamingEngine.plist
```

To stop the service, double-click the Stop Services application in `/Applications/WowzaStreamingEngine-4.7.7` or open a Terminal window and enter the following command:

```
sudo launchctl unload -w /Library/LaunchDaemons/com.wowza.WowzaStreamingEngine.plist
```

**Note**

The Start Services and Stop Services applications also start and stop the Wowza Streaming Engine Manager system service. See [Starting and stopping Wowza Streaming Engine Manager](#).

### Start and stop Wowza Streaming Engine in standalone mode (OS X)

To start the software, double-click the Start Standalone Mode application in `/Applications/WowzaStreamingEngine-4.7.7` or open a Terminal window and enter the following commands:

```
cd /Library/WowzaStreamingEngine-4.7.7/bin
./startup.sh
```
To stop the software, double-click the **Stop Standalone Mode** application in **/Applications/WowzaStreamingEngine-4.7.7** or open a Terminal window and enter the following commands:

```
cd /Library/WowzaStreamingEngine-4.7.7/bin
./shutdown.sh
```

**Note**

The **Start Standalone Mode** and **Stop Standalone Mode** applications also start and stop Wowza Streaming Engine Manager in standalone mode. See [Starting and stopping Wowza Streaming Engine Manager](#).

**Start and stop Wowza Streaming Engine as a service (Linux)**

**Note**

The operations in this section must be performed as the **root** user with **sudo** access.

To start the service, open a Terminal window and enter one of the following commands, depending on your Linux distribution:

```
sudo service WowzaStreamingEngine start
```

-or-

```
/etc/init.d/WowzaStreamingEngine start
```

To stop the service, enter:

```
sudo service WowzaStreamingEngine stop
```

-or-

```
/etc/init.d/WowzaStreamingEngine stop
```

**Notes**

- If these instructions don't apply to your Linux distribution, consult your Linux manual.
- The Linux services script subsystem doesn't use the full $PATH definition to determine the location of Linux commands. It uses what's known as the **init** path. This can lead to an issue on Linux distributions where the default installation location for Java can't be found by applying the **init** path. See [Manually install and troubleshoot Java on Wowza Streaming Engine](#).
Start and stop Wowza Streaming Engine in standalone mode (Linux)

To start the software, open a Terminal window and enter the following commands:

```
cd /usr/local/WowzaStreamingEngine/bin
./startup.sh
```

To stop the software, enter:

```
cd /usr/local/WowzaStreamingEngine/bin
./shutdown.sh
```

Uninstalling Wowza Streaming Engine

- **Windows** – Go to the Programs and Features Control Panel, click Wowza Streaming Engine 4.7.7, and then click Uninstall.
- **OS X** – Go to /Applications/Wowza Streaming Engine 4.7.7 and double-click Wowza Streaming Engine Uninstall.
- **Linux** – Run the following commands:

```
cd usr/local/WowzaStreamingEngine
sudo ./uninstall
```

Running Wowza Streaming Engine as a named user

On OS X and Linux, the default installation of Wowza Streaming Engine runs the server as the root user. If you want to run the server as a different user, follow the instructions in Run Wowza Streaming Engine as a named user (Linux and OS X) to create a new user and configure the server to run as that user.
**Note**

For security reasons, the non-root user can't bind to port numbers less-than or equal to 1024 on most Linux and Unix distributions. If you plan to run Wowza Streaming Engine on a lower-numbered port such as 80 (HTTP), 443 (HTTPS, RTMPS), or 554 (RTSP), Wowza Streaming Engine must run as the root user.

**Entering a new license key**

The license key you enter when you run Setup to install an instance of Wowza Streaming Engine is displayed in the License Keys box in Wowza Streaming Engine Manager. If you switch your licensing option for the Wowza Streaming Engine instance, you can replace the existing license key with the new license key without reinstalling the software. If you purchased license keys to enable the integrated Wowza Transcoder, Wowza nDVR, and Wowza DRM technologies for use with the licensed server instance, you can add these license keys. All license key values are stored in the `[install-dir]/conf/Server.license` file in the Wowza Streaming Engine installation.

Windows - `%WMSCONFIG_HOME%\conf\Server.license`

OS X - `/Library/WowzaStreamingEngine/conf/Server.license`

Linux/Unix - `/usr/local/WowzaStreamingEngine/conf/Server.license`

To add license keys in Wowza Streaming Engine Manager, do the following:

1. Click the Server tab, and then click Server Setup in the contents panel.
2. On the Server Setup page, click Edit.
3. In the License Keys box, enter your license key for Wowza Streaming Engine. If you need to enter multiple license keys (for example, for the media server software and for the Transcoder, nDVR, and DRM technologies), enter each license key on a separate line.
4. Click Save, and then click Restart Now at the top of the Server Setup page when prompted. The new license(s) take effect after the server is restarted.

**Notes**

- After you restart the server, Wowza Streaming Engine Manager displays the first and last five digits of the license keys that you entered in the License Keys box to help protect this information.

- You can also open the `Server.license` file in a text editor, enter each new license key on a new line, and then restart the server.
Perpetual and Subscription licenses for Wowza Streaming Engine

Perpetual and Subscription licenses for Wowza Streaming Engine provide for unlimited connections to the media server software instance and enable use of the Wowza Transcoder, Wowza nDVR, and Wowza DRM technologies that are integrated with each licensed instance.

A Perpetual license is best for stable, long-term demand. A Perpetual license key purchased after December 22, 2015 has an **EPBP4** prefix and is for use with one Wowza Streaming Engine instance and the integrated Transcoder, nDVR, and DRM technologies.

Server Setup

![Server Setup](image)

For details, see [Wowza Streaming Engine Pricing](#).

A Subscription license is best for variable demand. You can install as many instances of Wowza Streaming Engine as needed using the same license key and enable the Transcoder, nDVR, and DRM technologies integrated with each instance. A Subscription license key has an **ENGM4** prefix.
Server Setup

Name
Wowza Streaming Engine

Description
Wowza Streaming Engine is robust, customizable, and scalable server software that powers reliable streaming of high-quality video and audio to any device, anywhere.

License Keys
EN3N4-xxxxxx-xxxxxx-xxxxxx-4Syu

Default Stream Prefix
mp4

Options
- Enable monitoring and statistics for this server
- Allow RTP datagram port sharing

RTP Datagram Starting Port
6970

For details, see Wowza Streaming Engine Pricing.

Notes
- If you purchased a Perpetual license for Wowza Streaming Engine before December 23, 2015, and the license key has an EPBU4 prefix, it licenses Wowza Streaming Engine and the Wowza Transcoder and Wowza nDVR technologies. A separate license key is provided to enable the Wowza DRM technology integrated with the server instance (you don't have to enter the DRM license key in the License Keys box unless you want to enable this technology in Wowza Streaming Engine).

- If you purchased a license for Wowza Streaming Engine before January 1, 2015, contact sales@wowza.com to learn how to license the software.

Trial licenses for Wowza Streaming Engine

A Trial license for Wowza Streaming Engine lets you try out the software for free. After it expires and you acquire a new, paid license for the software, you must delete the Trial license key from the License Keys box and then add the new, paid key. If you’re not sure if a license key is a Trial key, you can find it in the email that you received from Wowza when you downloaded the trial software.

Note
You don't need to reinstall Wowza Streaming Engine or re-create its settings when you replace the Trial license key with a paid license for the software.
Ports used for streaming

Before streaming with Wowza Streaming Engine, you should open ports on your firewall. The following table shows the default ports that Wowza Streaming Engine uses for streaming. All of these port numbers are configurable through the configuration files that are described later in this guide.

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP 1935</td>
<td>RTMP/RTMPE/RTMPT/RTSP-interleaved streaming/WOWZ™</td>
</tr>
<tr>
<td>TCP 8086-8088</td>
<td>Administration</td>
</tr>
<tr>
<td>UDP 6970-9999</td>
<td>RTP UDP streaming</td>
</tr>
</tbody>
</table>

By default, Wowza Streaming Engine is configured to use only TCP port 1935 for streaming. You may want to configure additional ports for streaming such as TCP port 80 for HTTP or RTMPT streaming or TCP port 554 for RTSP streaming. To add an additional port, go to the Virtual Host Setup page in Wowza Streaming Engine Manager and edit the Default Streaming host port.
In the **Edit host port** dialog box, add the additional ports to the **Port(s)** list (this list is comma-delimited).

Wowza Streaming Engine can't share ports with other programs or services, so make sure no other programs or services are running on the added ports.

The following table shows some of the common ports used for streaming.

<table>
<thead>
<tr>
<th>Port</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP 80</td>
<td>Adobe HDS, Apple HLS, Microsoft Smooth Streaming, MPEG-DASH streaming, RTMPT</td>
</tr>
<tr>
<td>TCP 443</td>
<td>RTMPS, HTTPS</td>
</tr>
<tr>
<td>TCP 554</td>
<td>RTSP</td>
</tr>
</tbody>
</table>

**Server configuration and tuning**

Wowza Streaming Engine configuration settings are stored in a set of XML configuration and properties files in the `[install-dir]/conf` folder. The settings can be changed by configuring options and properties in Wowza Streaming Engine Manager or by editing them in a text editor. If you choose to manage Wowza Streaming Engine configuration settings by editing the XML files directly, be sure to review the [Wowza Streaming Engine Configuration Reference Guide](#), which describes the most commonly used configuration settings.
The following configuration files are read when the server starts:

**Server configuration files**

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MediaCache.xml</td>
<td>Media Cache configuration</td>
</tr>
<tr>
<td>Server.xml</td>
<td>General server configuration</td>
</tr>
<tr>
<td>Tune.xml</td>
<td>Server performance tuning configuration</td>
</tr>
<tr>
<td>VHosts.xml</td>
<td>Virtual hosts definition</td>
</tr>
<tr>
<td>log4j.properties</td>
<td>Logging configuration</td>
</tr>
</tbody>
</table>

**VHost configuration files**

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>StartupStreams.xml</td>
<td>Streams started at virtual host startup</td>
</tr>
<tr>
<td>VHost.xml</td>
<td>Virtual host configuration</td>
</tr>
<tr>
<td>VHosts.xml</td>
<td>Virtual hosts configuration</td>
</tr>
</tbody>
</table>

**Application configuration files**

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application.xml</td>
<td>Application configuration</td>
</tr>
</tbody>
</table>

Wowza Streaming Engine is automatically tuned to take best advantage of available hardware resources when the server starts. The server calculates an appropriate Java heap size, garbage collection (GC) settings, and other Java command-line options based on available hardware, the computer and Java Virtual Machine (JVM) bitness, and other factors.

By default, Wowza Streaming Engine sets the Java heap size to a value that’s suitable for application development environments. Before you deploy the server in production environments where it may use memory extensively when heavily loaded, you can select an option in Wowza Streaming Engine Manager that automatically sets the heap size to a predefined value that's appropriate for production use. You can also adjust many other performance settings from the default values that are calculated by the server in Wowza Streaming Engine Manager to fine-tune the server's performance. See [Tune Wowza Streaming Engine for optimal performance](#).

**Software updates**

Between production releases, development builds are produced periodically in the form of updates. This gives you early access to new features in the latest Wowza Streaming Engine release and to give feedback. Information about what’s included in each update is included in a README.txt file that’s included in the update archive (.zip) file. For more information about how to apply an update to your server software, see [Update your Wowza Streaming Engine installation](#).
Application Configuration

How do I create and configure an application for streaming?

Wowza Streaming Engine is designed to handle multiple streaming protocols. All streaming is controlled through the creation and configuration of streaming applications. One application can be configured to simultaneously deliver either live or VOD content to multiple player technologies. It’s easy to define an application in Wowza Streaming Engine Manager. For example, to create a new application named myapplication, do the following:

1. Click the Applications tab in Wowza Streaming Engine Manager and then click Add Application in the contents panel.
2. On the Add Application page, review the content in the Help pane to decide what type of application you want to create.
3. Click the application type in the Add Application page.
4. In the New Application dialog box, enter the name myapplication and then click Add.
5. The myapplication page is displayed so that you can configure the application settings.

A single application can be configured to deliver a live or VOD stream at the same time to Adobe Flash Player, Apple iOS devices, or Apple TV digital media extender, Roku and Amino set-top boxes, Microsoft Silverlight, DASH clients, and RTSP/RTP-based players (including 3GPP and Android devices). The Connect live sources section of the Wowza Streaming Engine documentation website has numerous articles for configuring applications for common streaming scenarios. The remainder of this chapter covers application configuration details. For more detailed configuration information, see the Wowza Streaming Engine Configuration Reference Guide.
Applications and application instances
(Application.xml)

An Application.xml file defines the configuration that you set up in Wowza Streaming Engine Manager for a given application. An application instance is an instantiation of an application and provides a namespace and context for streaming. An application instance is started dynamically; a single application can have multiple named application instances running simultaneously. If no name is specified for an application instance, then the default name _definst_ is used. In many streaming scenarios, a single application instance is used per-application and the name is never referenced and defaults to _definst_. It's more common to use multiple application instances in video chat and video conferencing scenarios where you must create multiple rooms for streaming. In this case, application instances are used to separate streaming into rooms. Each room is a separate application instance, which provides separation and a namespace for each room.

When an application instance is loaded, it looks in the following locations for an Application.xml file (where [application] is the application name):

[install-dir]/conf/[application]/Application.xml
[install-dir]/conf/Application.xml

The first Application.xml file that's found is used.

URL formats

All streaming in Wowza Streaming Engine is initiated with a Uniform Resource Locator (URL). The application and application instance names are specified as part of the streaming URL. The URL formats used for streaming, whether for Adobe Flash Player, Apple iOS devices, Microsoft Silverlight, DASH clients, or RTSP/RTP, follow a similar format:

[protocol]://[address]:[port]/[application]/[appInstance]/[streamName]/[post-fix]

-where-

[protocol]: - streaming protocol (http, rtmp, rtsp, and so on)
[address]: - address of the server running Wowza Streaming Engine
[port]: - port number to use for streaming (1935 is the default)
[application] - application name
[appInstance] - application instance name
[streamName] - stream name and prefix
[post-fix] - option information specific to player technology
In most streaming scenarios, if \([\text{streamName}]\) doesn't have path elements and the default \([\text{appInstance}]\) name is used, the URL can be shortened to:

\([\text{protocol}]://[\text{address}]:[\text{port}]/[\text{application}]/[\text{streamName}]\)

The following are example URLs for different player technologies. The examples assume that a live video with the stream name \textit{myStream} using the application name \textit{live} is streamed.

**Adobe HDS**

http://mycompany.com:1935/live/myStream/manifest.f4m

**Apple HLS**

http://mycompany.com:1935/live/myStream/playlist.m3u8

**Microsoft Smooth Streaming**


**MPEG-DASH Streaming**


**Adobe RTMP**

Server: rtmp://mycompany.com/live
Stream: myStream

**RTSP/RTP**

rtsp://mycompany.com:1935/live/myStream

Now is probably a good time to take a quick look at the default settings for applications. The rest of this chapter describes the most commonly configured items.

**Stream types**

Wowza Streaming Engine uses named stream types to control the different types of streaming (live, VOD, chat, remote recording, and so on.). Stream types are automatically configured when you create different application types and configure their options in Wowza Streaming Engine Manager. You can also edit the \texttt{Streams/StreamType} property in \texttt{Application.xml} using a text editor to change the stream type for an application. The following table shows the stream types and their uses.
<table>
<thead>
<tr>
<th>Stream type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>default</td>
<td>VOD</td>
</tr>
<tr>
<td>file</td>
<td>VOD</td>
</tr>
<tr>
<td>live</td>
<td>Publish and play live content (best for one-to-many streaming of live events)</td>
</tr>
<tr>
<td>live-lowlatency</td>
<td>Publish and play live content over RTMP (best for one-to-one or one-to-few video/audio chat applications)</td>
</tr>
<tr>
<td>live-record</td>
<td>Same as live—in addition content is recorded</td>
</tr>
<tr>
<td>live-record-lowlatency</td>
<td>Same as live-lowlatency—in addition content is recorded</td>
</tr>
<tr>
<td>live-repeater-edge</td>
<td>Publish and play live content across multiple Wowza servers in an origin/edge configuration (used to configure edge application)</td>
</tr>
<tr>
<td>live-repeater-edge-lowlatency</td>
<td>Publish and play live content across multiple Wowza servers in an origin/edge configuration (used to configure edge application when latency is important)</td>
</tr>
<tr>
<td>live-repeater-edge-origin</td>
<td>Publish and play live content across multiple Wowza servers in an origin/edge/edge configuration (used to configure a middle-edge application)</td>
</tr>
<tr>
<td>record</td>
<td>Video recording</td>
</tr>
<tr>
<td>rtp-live</td>
<td>Re-stream RTSP/RTP, native RTP, or MPEG-TS streams</td>
</tr>
<tr>
<td>rtp-live-lowlatency</td>
<td>Re-stream RTSP/RTP, native RTP, or MPEG-TS streams when latency is important</td>
</tr>
<tr>
<td>rtp-live-record</td>
<td>Same as rtp-live—in addition content is recorded</td>
</tr>
<tr>
<td>rtp-live-record-lowlatency</td>
<td>Same as rtp-live-lowlatency—in addition content is recorded</td>
</tr>
<tr>
<td>shoutcast</td>
<td>Re-stream SHOUTcast/Icecast MP3 or AAC+ audio streams</td>
</tr>
<tr>
<td>shoutcast-record</td>
<td>Same as shoutcast—in addition content is recorded</td>
</tr>
</tbody>
</table>

Each stream type exposes properties that are used for tuning the stream type. For example, the stream type definitions for `live` and `live-lowlatency` differ only in the tuning that’s accomplished through the stream properties. Defined properties for a stream type can be
overridden on a per-application basis by defining new property values on an application’s **Properties** tab in Wowza Streaming Engine Manager or by editing the **Streams/Properties** container in **Application.xml**.

**HTTP streamers and live stream packetizers**

HTTP streamers define the streams in an application (live or VOD) that are available for playback to different player technologies. In Wowza Streaming Engine Manager, you can select one or more of the following **Playback Types** options for an application. When selecting multiple options, the corresponding HTTP streamers are added to the **<HTTPStreamers>** section in **Application.xml** as a comma-separated list.

<table>
<thead>
<tr>
<th>Playback Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adobe HDS</td>
<td>Enables the application to stream live and VOD content to Flash Player using the Adobe HDS protocol. It adds the <strong>sanjosestreaming</strong> HTTP streamer to the <strong>&lt;HTTPStreamers&gt;</strong> section in <strong>Application.xml</strong>.</td>
</tr>
<tr>
<td>Apple HLS</td>
<td>Enables the application to stream live and VOD content to iOS-based devices (iOS version 3.0 or later), QuickTime player (version 10 or later), Safari browser (version 4.0 or later), and to other devices such as Roku and Amino set-top boxes and some brands of smart TVs, using the Apple HLS protocol. It adds the <strong>cupertinostreaming</strong> HTTP streamer to the <strong>&lt;HTTPStreamers&gt;</strong> section in <strong>Application.xml</strong>.</td>
</tr>
<tr>
<td>Microsoft Smooth Streaming</td>
<td>Enables the application to stream live and VOD content to Microsoft Silverlight using the Microsoft Smooth Streaming protocol. It adds the <strong>smoothstreaming</strong> HTTP streamer to the <strong>&lt;HTTPStreamers&gt;</strong> section in <strong>Application.xml</strong>.</td>
</tr>
<tr>
<td>MPEG-DASH</td>
<td>Enables the application to stream live and VOD content to DASH clients using the Dynamic Adaptive Streaming over HTTP (DASH) protocol. It adds the <strong>mpegdashstreaming</strong> HTTP streamer to the <strong>&lt;HTTPStreamers&gt;</strong> section in <strong>Application.xml</strong>.</td>
</tr>
</tbody>
</table>
nDVR (live streaming only) | When you enable the nDVR feature for live or live http origin applications in Wowza Streaming Engine Manager, it enables the application to stream live content from Wowza Streaming Engine (origin) to Wowza Streaming Engine (edge). It adds the dvrchunkstreaming HTTP streamer to the `<HTTPStreamers>` section in `Application.xml`.

Live streams coming into Wowza Streaming Engine must be packaged (**packetized**) before they can be delivered to clients using HTTP streaming protocols. The `<Streams>/<LiveStreamPacketizers>` section in `Application.xml` specifies the streaming protocols that are used when packetizing live streams. There are two types of packetizers: streaming packetizers and repeater packetizers.

Streaming packetizers are used when delivering a live stream from a single Wowza Streaming Engine server to clients. They’re also used when delivering a live stream from a Wowza Streaming Engine origin server to an edge server when using the live repeater mechanism in an origin/edge configuration. When you select **Playback Types** options in Wowza Streaming Engine Manager to create HTTP streamers for live applications, the corresponding live stream packetizer values (separated by commas) are added to the `<LiveStreamPacketizers>` section in `Application.xml`.

<table>
<thead>
<tr>
<th>Playback Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adobe HDS</td>
<td>Enables Adobe HDS live streaming to Flash Player. It adds the sanjosestreamingpacketizer streaming packetizer to the <code>&lt;LiveStreamPacketizers&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td>Apple HLS</td>
<td>Enables Apple HLS live streaming to iOS devices. It adds the cupertinostreamingpacketizer streaming packetizer to the <code>&lt;LiveStreamPacketizers&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td>Microsoft Smooth Streaming</td>
<td>Enables Microsoft Smooth Streaming to Silverlight. It adds the smoothstreaming streaming packetizer to the <code>&lt;LiveStreamPacketizers&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td>MPEG-DASH</td>
<td>Enables MPEG-DASH streaming to DASH clients. It adds the mpegdashstreamingpacketizer streaming packetizer to the <code>&lt;LiveStreamPacketizers&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td>Playback Type</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Adobe HDS</td>
<td>Enables Adobe HDS live stream repeater for Flash Player. It adds the <code>sanjosestreamingrepeater</code> repeater packetizer to the <code>&lt;LiveStreamPacketizers&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td>Apple HLS</td>
<td>Enables Apple HLS live stream repeater for iOS-based devices. It adds the <code>cupertinostreamingrepeater</code> repeater packetizer to the <code>&lt;LiveStreamPacketizers&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td>Microsoft Smooth Streaming</td>
<td>Enables Microsoft Smooth Streaming live stream repeater for Silverlight. It adds the <code>smoothstreamingrepeater</code> repeater packetizer to the <code>&lt;LiveStreamPacketizers&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td>MPEG-DASH</td>
<td>Enables MPEG-DASH live stream repeater for DASH clients. It adds the <code>mpegdashstreamingrepeater</code> repeater packetizer to the <code>&lt;LiveStreamPacketizers&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td>nDVR</td>
<td>When you enable the nDVR feature for live edge applications in Wowza Streaming Engine Manager, it adds the <code>dvrstreamingrepeater</code> repeater packetizer to the <code>&lt;LiveStreamPacketizers&gt;</code> section in <code>Application.xml</code> for use with nDVR.</td>
</tr>
</tbody>
</table>
For more information about how to implement the live stream repeater (origin/edge) mechanism for delivering a live media event across multiple Wowza servers, see Live stream repeater (origin/edge live streaming).

**Note**

The nDVR feature in Wowza Streaming Engine provides the ability to record a live stream while simultaneously allowing users to play or pause the live stream, rewind to a previously recorded point, or resume viewing at the live point. This capability can be extended to an edge Wowza Streaming Engine server in an origin/edge configuration. See Set up a Wowza Streaming Engine live stream repeater for Wowza nDVR.

**Timed text providers**

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

**Closed captioning for live streams**

For live streams, Wowza Streaming Engine can ingest instream closed caption information from CEA-608 data or AMF onTextData events. These ingested captions can be delivered as CEA-608-formatted SEI data in Apple HLS streams or as onTextData events in Adobe HDS and Adobe RTMP streams. In addition, instream CEA-608 caption data can be passed through Wowza Transcoder for delivery in Apple HLS streams. For live and live edge applications in Wowza Streaming Engine Manager, you can configure the following Closed Caption Sources options to enable the application to ingest the caption data.

<table>
<thead>
<tr>
<th>Live Closed Caption Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>onTextData events in live streams</td>
<td>This option enables the application to monitor live streams for Action Message Format (AMF) onTextData captions, decode the captions, and convert them to CEA-608-formatted SEI data in Apple HLS streams. It adds the ModuleOnTextDataToCEA608 module to the &lt;Modules&gt; section in Application.xml.</td>
</tr>
</tbody>
</table>
### Embedded CEA-608 captions in live streams

This option enables the application to monitor live streams for CEA-608 captions, decode the captions, and convert them to onTextData events in Adobe HDS and Adobe RTMP streams. It adds the ModuleCEA608ToOnTextData module to the `<Modules>` section in Application.xml.

### onCaptionInfo events in live streams

Specified by the onCaptionInfo events in live streams option. This option enables the application to monitor live streams for AMF onTextData events and pass them through in Adobe HDS and Adobe RTMP streams. It adds the captionLiveIngest property to the `<TimedText>/<Properties>` section in Application.xml.

See [Configure closed captioning for Wowza Streaming Engine live streams](#).

### Closed captioning for video-on-demand streams

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). The ingested captions can be delivered as CEA-608-formatted SEI data in Apple HLS streams or as Action Message Format (AMF) onTextData events in Adobe HDS and Adobe RTMP streams. For VOD and VOD edge applications in Wowza Streaming Engine Manager, you can select one or more of the following Closed Caption Sources options to ingest caption data. When selecting multiple options, the corresponding timed text providers are added to the `<TimedText>` section in Application.xml as a comma-separated list.

<table>
<thead>
<tr>
<th>VOD Closed Caption Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embedded 3GPP/MPEG-4 Timed Text tracks</td>
<td>This option enables the application to pull captions directly from 3GPP tracks (codecID &quot;tx3g&quot;) that are embedded in MP4 VOD assets. This option is enabled by default. It adds the vodcaptionprovidermp4_3gpp timed text provider to the <code>&lt;TimedText&gt;</code> section in Application.xml.</td>
</tr>
</tbody>
</table>
### Transcoder and nDVR configurations

The `<Transcoder>` and `<DVR>` containers in an `Application.xml` file serve to configure a Wowza Streaming Engine application to use the Wowza Transcoder and nDVR features. See the [Wowza Streaming Engine Configuration Reference Guide](https://www.wowza.com/products/streaming-engine/configuration) and these articles:

- [Set up and run Wowza Transcoder in Wowza Streaming Engine](https://www.wowza.com/products/streaming-engine/configuration/transcoder)
- [Set up and run Wowza nDVR in Wowza Streaming Engine](https://www.wowza.com/products/streaming-engine/configuration/dvr)

### Modules

Modules are Java classes that are loaded dynamically when an application instance is loaded and provide an application's functionality. In Wowza Streaming Engine Manager, the Modules list defines an order-dependent list of modules to load for a given application.

---

<table>
<thead>
<tr>
<th>Caption Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timed Text (TTML/DXFP) file</strong></td>
<td>This option enables the application to pull captions from an external TTML-formatted caption file that sits next to the VOD asset in the application's content directory. It adds the <code>vodcaptionproviderhtml</code> timed text provider to the <code>&lt;TimedText&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td><strong>SubRip (SRT) file</strong></td>
<td>This option enables the application to pull captions from an external SRT-formatted caption file that sits next to the VOD asset in the application's content directory. It adds the <code>vodcaptionprovidersrt</code> timed text provider to the <code>&lt;TimedText&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td><strong>Web Video Text Track (WebVTT) file</strong></td>
<td>This option enables the application to pull captions from an external WebVTT-formatted caption file that sits next to VOD asset in the application's content directory. It adds the <code>vodcaptionproviderwebvtt</code> timed text provider to the <code>&lt;TimedText&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
<tr>
<td><strong>Scenarist Closed Caption (SCC) file</strong></td>
<td>This option enables the application to pull captions from an external SCC-formatted caption file that sits next to VOD asset in the application's content directory. It adds the <code>vodcaptionproviderscc</code> timed text provider to the <code>&lt;TimedText&gt;</code> section in <code>Application.xml</code>.</td>
</tr>
</tbody>
</table>

Many AddOn packages provide additional functionality through the use of modules. See [Use Wowza Streaming Engine Java modules](#).

In Wowza Streaming Engine Manager, click the **Modules** tab on an application page to see the list of modules that are loaded.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Fully Qualified Class Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>base</td>
<td>Base</td>
<td>com.wowza.wms.module.ModuleCore</td>
</tr>
<tr>
<td>logging</td>
<td>Client Logging</td>
<td>com.wowza.wms.module.ModuleClientLogging</td>
</tr>
<tr>
<td>flv/playback</td>
<td>FLV/Playback</td>
<td>com.wowza.wms.module.ModuleFLVPlayback</td>
</tr>
<tr>
<td>ModuleCoreSecurity</td>
<td>Core Security Module for Applications</td>
<td>com.wowza.wms.security.ModuleCoreSecurity</td>
</tr>
</tbody>
</table>

Each module must have a unique **Name**. The **Description** for provides a detailed description of the module and isn't used in any operations. The **Class** item is the fully qualified path to the Java class that provides the module’s functionality. In general, new modules are always added to the end of the **Modules** list. The Java class that makes up a server-side module is most often bound to a **.jar** file in the Wowza Streaming Engine installation. Wowza Streaming Engine comes with many modules that can be added to the **Modules** list to provide additional functionality. For information, see [Use Wowza Streaming Engine Java modules](#). You can also use the Wowza IDE to develop your own custom modules to provide additional functionality. See [Extend Wowza Streaming Engine using the Wowza IDE](#).

**Notes**

- Access to the **Modules** tab is limited to administrators with advanced permissions. See [Managing sign-in credentials](#).
- Wowza provides an assortment of ready-to-use utility modules for Wowza Streaming Engine applications. For a complete list, see [Module examples](#).

**Properties**

Properties are name/value pairs that provide a means for tuning and modifying the default application configuration. Properties can also be used server-side as a means to pass data to
custom modules from applications. Properties are listed in the Application.xml configuration file and are defined using the format:

```xml
<Property>
    <Name>[name]</Name>
    <Value>[value]</Value>
    <Type>[type]</Type>
</Property>
```

Where `<Name>` is the property name, `<Value>` is the property value, and `<Type>` is the property type. Valid property types are: `Boolean`, `Integer`, `Long`, and `String`.

In Wowza Streaming Engine Manager, you can click the Properties tab on an application page and enable default properties to either add them to the application configuration or to override existing property values. For details about the properties, see the Wowza Streaming Engine Configuration Reference Guide.

Many articles on the Wowza docs website prescribe custom properties for tuning Wowza Streaming Engine and for adding advanced functionality. When adding custom properties, it’s important to add them to the correct `<Properties>` container in Application.xml. The article instructions always specify the Path value to use in the Add Custom Property dialog box, which adds the property to the correct `<Properties>` container.

**Note**

Access to the Properties tab is limited to administrators with advanced permissions. See Managing sign-in credentials.
Media types

Media types aren't defined in application configuration files but are an important part of streaming. Wowza Streaming Engine supports many media types. It can read the following media or file types:

- **MP4** (QuickTime container -.mp4, .f4v, .mov, .m4a, .m4v, .mp4a, .mp4v, .3gp, .3g2, etc.)
- **FLV** (Flash Video - .flv)
- **MP3** content (.mp3)
- **SMIL** (Synchronized Multimedia Integration Language - .smil)
- **AMLST** (API-based MediaList)

Media types are specified by appending a prefix to the stream name. For example to play the MP4 file `mycoolvideo.mov`, use the stream name `mp4:mycoolvideo.mov`, where `mp4:` is the media type prefix. If no media type prefix is specified, the media type prefix defaults to `mp4:`.

The following table shows the supported media type prefixes.

<table>
<thead>
<tr>
<th>Media type prefix</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mp4:</td>
<td>QuickTime container (default if no prefix specified)</td>
</tr>
<tr>
<td>flv:</td>
<td>Flash Video</td>
</tr>
<tr>
<td>mp3:</td>
<td>MP3 file</td>
</tr>
<tr>
<td>id3:</td>
<td>MP3 file (returns only ID3 tag information)</td>
</tr>
<tr>
<td>smil:</td>
<td>Synchronized Multimedia Integration Language (for adaptive bitrate delivery)</td>
</tr>
<tr>
<td>ngrp:</td>
<td>Named Group (for adaptive bitrate delivery)</td>
</tr>
<tr>
<td>amlst:</td>
<td>API-based MediaList (for adaptive bitrate delivery)</td>
</tr>
</tbody>
</table>

The media type prefix is also used to control the file container that stores recorded live video. When publishing video, if the `mp4:` media type prefix is specified or if no prefix is specified, then the content is recorded to an **MP4** (QuickTime) container. Only H.264, AAC, and MP3 content can be recorded to an **MP4** container. If the `flv:` media type prefix is specified, an **FLV** (Flash Video) container is used.

Synchronized Multimedia Integration Language (.smil) files provide a means to specify a group of live streams or VOD files for adaptive bitrate switching. For stream switching to
occur correctly, key frames must be properly aligned across all of the available bitrates in a live stream. For VOD, multiple files must be pre-encoded to the desired bitrates and have key frames that are aligned across all of the encoded files. The **smil** media type prefix is used to playback the content that’s specified in .smil files.

 WoWza Transcoder uses a templating system to group streams into logical groups (called **stream name groups**) for live adaptive bitrate delivery. Stream name groups and SMIL files serve the same purpose and either method can be used for playback of live streams. Stream name groups are defined in the transcoder template and are available for playback using the **ngrp** media type prefix.

The Wowza Streaming Engine Java API can be used to intercept requests for adaptive bitrate streams and provide the stream grouping. To use this feature, you must use the **amlst**: stream name prefix to use a set of Java objects that describe the adaptive bitrate stream (an **API-based MediaList**). When Wowza Streaming Engine reads a SMIL file, it creates a MediaList and passes it back to the streaming provider. The API provides a means for intercepting the requests and creating the MediaList dynamically in a Wowza Streaming Engine module. See **Use Java API calls to resolve SMIL file requests (AMLST)**.

### Content storage

By default, Wowza Streaming Engine streams VOD content from (and records VOD content to) the **[install-dir]/content** folder. You can specify a different storage location for a VOD application in Wowza Streaming Engine Manager by changing the **Content Directory** value for the application. For example, to configure an application to use an application-specific content folder, you can select the **Application-specific directory** option:

```
Content Directory
  ○ Use default
  ○ Application-specific directory
    $com.wowza.wms.context.VHost(ConfigHome)/content/vod

Use the following directory:
```

Using this setting, content is streamed from the **[install-dir]/content/[application]** folder, where **[application]** is the application’s name (vod).

Files that are required for streaming live content, such as Session Description Protocol (SDP) or **.stream** files, are also stored in the **[install-dir]/content** folder by default. You can specify
a different storage location for a live application in Wowza Streaming Engine Manager by changing the **Streaming File Directory** value for the application. For example, to configure an application to use an application-specific folder, you can select the **Application-specific directory** option:

![Screenshot of Wowza Streaming Engine Manager settings](image)

Using this setting, the files can be accessed from the `[install-dir]/content/[application]` folder, where `[application]` is the application's name (live).

You can further customize content storage for your applications by specifying the fully qualified path to the storage location in the **Use the following directory** box. You can substitute variables in place of path elements. The following variables are supported:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>${com.wowza.wms.AppHome}</code></td>
<td>Application home directory</td>
</tr>
<tr>
<td><code>${com.wowza.wms.ConfigHome}</code></td>
<td>Configuration home directory</td>
</tr>
<tr>
<td><code>${com.wowza.wms.context.VHost}</code></td>
<td>Virtual host name</td>
</tr>
<tr>
<td><code>${com.wowza.wms.context.VHostConfigHome}</code></td>
<td>Virtual host configuration directory</td>
</tr>
<tr>
<td><code>${com.wowza.wms.context.Application}</code></td>
<td>Application name</td>
</tr>
<tr>
<td><code>${com.wowza.wms.context.ApplicationInstance}</code></td>
<td>Application instance name</td>
</tr>
</tbody>
</table>
Advanced Configuration

How do I use Wowza Streaming Engine features?

This chapter covers more advanced streaming topics. Some of the functionality discussed is provided by AddOns, which are downloadable packages that include extensions for adding more advanced features to Wowza Streaming Engine.

MediaCasters, Stream files, and Startup Streams

Wowza Streaming Engine includes a system for re-streaming live streams called MediaCaster. MediaCaster re-streams IP camera streams (RTSP/RTP streams), SHOUTcast/Icecast streams, streaming output from native RTP or MPEG-TS encoders, and RTMP streams from another Wowza Streaming Engine server (liverepeater streams).

MediaCaster pulls a stream from a stream source and makes it available for streaming to all player technologies supported by Wowza Streaming Engine. The system works on demand: When the first request is received from a player for a given stream, a connection is made to the source stream and the stream is then made available to the player. When the last player stops watching the stream, MediaCaster waits for a timeout period. If no other players request the stream, the stream is stopped and isn't available for streaming until another request is made.

This on-demand startup methodology works great for RTMP and RTSP/RTP streaming where advanced packetization isn't required. However, the model doesn't work for the HTTP streaming protocols (Adobe HDS, Apple HLS, Microsoft Smooth Streaming, and MPEG-DASH streaming). An Apple iOS device requires about 30 seconds of video to be pre-packetized before playback can start, and Microsoft Silverlight clients require three times the key frame duration. Therefore, the stream must be started before it's ready for streaming over HTTP.

Wowza Streaming Engine Manager provides features to start receiving MediaCaster streams and to keep them running.
Stream files

An easy method for re-streaming live MediaCaster streams is to configure a Stream file (a file with a .stream file name extension) that live applications can use to connect to the source stream through the MediaCaster system. A Stream file just contains the URI of the source stream. When the source stream is started, a live application can use the information in the Stream file to connect to the stream so that it's available for playback when requested by players.

As an example, to create a Stream file named **mycoolevent.stream**, do the following:

1. Click the **Server** tab in Wowza Streaming Engine Manager and then click **Stream Files** in the contents panel.
2. On the **Virtual Host Stream Files** page, click **Add Stream File**.
3. In the **Add Stream File** dialog box, enter the name **mycoolevent** and then click **Add**. The **mycoolevent.stream** page is displayed.
4. In **Stream URI**, enter the source stream URI and then click **Save**. For example, if you're using an MPEG-TS encoder, the URI value might be **udp://0.0.0:10000**.
5. Click **Return to Stream Files**.
6. Click the **Connect** icon for **mycoolevent.stream**.

---

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7. In the **Connect a Stream File** dialog box, configure the options to enable a live application to connect to the stream and then click **OK**.

Be sure to select the **MediaCaster Type** in the list that corresponds to the source stream type:

- Select **rtp** for IP Camera streams (RTSP/RTP streams) and for streams from native RTP and MPEG-TS encoders.
- Select **shoutcast** for SHOUTcast/Icecast streams.
- Select **liverepeater** if the stream is an RTMP stream pulled from another server that’s running Wowza Media Server or Wowza Streaming Engine software.

You can then use **mycoolevent.stream** in the following example URLs to play the stream:

**Adobe HDS**

http://[wowza-ip-address]/live/mycoolevent.stream/manifest.f4m

**Apple HLS**

http://[wowza-ip-address]/live/mycoolevent.stream/playlist.m3u8

**Microsoft Smooth Streaming**
http://[wowza-ip-address]/live/mycoolevent.stream/Manifest

**MPEG-DASH**

http://[wowza-ip-address]/live/mycoolevent.stream/manifest.mpd

**Adobe RTMP**

Server: rtmp://[wowza-ip-address]/live
Stream: mycoolevent.stream

**RTSP/RTP**

rtsp://[wowza-ip-address]/live/mycoolevent.stream

**Note**

In the **SMIL Files** feature in Wowza Streaming Engine Manager, you can connect to live MediaCaster streams that are referenced in Synchronized Multimedia Integration Language (SMIL) files. In the **Incoming Streams** feature, you can connect to MediaCaster streams to record them.

**Startup Streams**

The second method for starting live MediaCaster streams is to use the **Startup Streams** feature in Wowza Streaming Engine Manager to create stream entries in the `[install-dir]/conf/StartupStreams.xml` file. Stream entries in this file are automatically started when the server is started (or more specifically, when a virtual host is started). The format of a single entry in **StartupStreams.xml** is:
As an example, to create a stream entry in *StartupStreams.xml*, do the following:

1. Click the **Server** tab in Wowza Streaming Engine Manager and then click **Startup Streams** in the contents panel.
2. On the **Virtual Host Startup Streams** page, click **Add Startup Stream**.
3. In the **Add to Startup Streams** dialog box, configure the options to create the entry in the **StartupStreams.xml** file and then click **OK**.

![Add to Startup Streams dialog box](image)

- **Stream Name**: input the name of the stream
- **Application Name**: select the application
- **Application Instance**:
  - Connect to default application instance: _default_
  - Connect to application instance: input the application instance name
- **MediaCaster Type**: select the media caster type

See **Start streams when Wowza Streaming Engine starts**.

**Note**

The following server-side methods can also be used to start and stop streams using the MediaCaster system:

```java
IApplicationInstance.startMediaCasterStream(...);
IApplicationInstance.stopMediaCasterStream(...);
```

For more information about these methods, see the **Wowza Streaming Engine Java API reference documentation**.

**Live stream repeater (origin/edge live streaming)**

A live stream repeater uses multiple Wowza Streaming Engine servers in an origin/edge configuration to deliver live content across multiple servers. The encoded content is delivered to the origin server in the same manner as if you were delivering the content to a single Wowza Streaming Engine server. A player requests the content from an edge server, which maintains a single connection per-unique stream to the origin. Origin/edge
configuration occurs at the application level. A single Wowza Streaming Engine instance can be configured as an origin for one application and as an edge for another application.

The example in this section uses a single origin server with an application named liveorigin. To configure the origin server, do the following:

1. In Wowza Streaming Engine Manager, click the Applications tab.
2. On the Add Application page, click Live.
3. In the New Application dialog box, enter the following application name: liveorigin
4. On the liveorigin application page, select the following Playback Types:
   - MPEG-DASH
   - Apple HLS
   - Adobe HDS
   - Microsoft Smooth Streaming
5. Click Save.

To configure an edge server, do the following (repeat on each edge server):

1. In Wowza Streaming Engine Manager, click the Applications tab.
2. On the Add Application page, click Live Edge.
3. In the New Application dialog box, enter the following application name: liveedge
4. On the liveedge application page, select the following Playback Types:
   - MPEG-DASH
   - Apple HLS
   - Adobe HDS
   - Microsoft Smooth Streaming
5. If low latency is important, select the Low-latency stream check box (this adds extra load to the server).
6. In Primary Origin URL, Enter the URL of the liveorigin application using the WOWZ protocol URL prefix (wowz://). For example, if the origin server uses the domain name origin.mycompany.com, the value would be:

   wowz://origin.mycompany.com/liveorigin
7. Click Save.

In the following examples, assume that the origin server uses the domain name `origin.mycompany.com` and that there are three edge servers with the domain names `edge1.mycompany.com`, `edge2.mycompany.com`, and `edge3.mycompany.com`. If the stream name is `mycoolevent`, the URLs for players streaming from `edge1` would be:

**Adobe HDS**

http://edge1.mycompany.com:1935/liveedge/mycoolevent/manifest.f4m

**Apple HLS**

http://edge1.mycompany.com:1935/liveedge/mycoolevent/playlist.m3u8

**Microsoft Smooth Streaming**

http://edge1.mycompany.com:1935/liveedge/mycoolevent/Manifest

**MPEG-DASH**


You can configure more than one origin server to provide a hot backup if the primary origin server goes offline. For example, if the failover origin server has the domain name `origin2.mycompany.com`, and it's configured identically as the primary origin server, you would specify the following **Secondary Origin URL** value in the `liveedge` application page on each edge server:

wowz://origin2.mycompany.com/liveorigin

Edge servers try to connect to the first origin server, and if this fails, they try to connect to the second origin server.

This example assumes that you're using an encoder in which the stream name is a simple name and not a URL. If you're using an encoder such as an MPEG-TS encoder in which the stream name isn't a simple stream name, you can use `.stream` files on the origin server to hide the complex stream names. For example, if your complex stream name on the origin server is `udp://0.0.0.0:10000`, use the **Stream Files** feature in Wowza Streaming Engine Manager to create a file named `mycoolevent.stream` and set the contents to `udp://0.0.0.0:10000`. You can then use `mycoolevent.stream` in place of `mycoolevent` in the example URLs above to play the stream.

**Notes**

- WOWZ is a TCP-based messaging protocol in Wowza Streaming Engine and is used for server-to-server communication. It's enabled by default. If one of the servers in the origin/edge configuration
is running a version of Wowza Streaming Engine that doesn't support WOWZ, an RTMP connection is established instead.

- You can secure the connection between Wowza Streaming Engine servers in and origin/edge configuration by using a SecureToken shared secret. See Configure a live stream repeater in Wowza Streaming Engine.
- If you use a non-push-based encoder (native RTP or MPEG-TS) and streaming players using any of the HTTP streaming protocols, you must use the Startup Streams feature in Wowza Streaming Engine Manager to start the stream on the origin server and keep it running. Streams don't need to be kept running on edge servers.
- To provide load balancing between edge servers, you can use the dynamic load balancing system. See Get the Dynamic Load Balancing AddOn for Wowza Streaming Engine.

### Live stream recording

There are multiple ways to record live streams to VOD files for later playback, but the Incoming Streams feature for live applications in Wowza Streaming Engine Manager gives you the most control over the recording process. You can split in-process live stream recording archives into multiple on demand MP4 (QuickTime container) or FLV (Flash Video container) files automatically, with the split points based on video duration, clock time, or file size. The user interface shows all current live source streams and enables you to control when the recording starts and stops, the file name and locations, the container format, and other details. You can also control the live stream recording process using HTTP URL queries and programmatically using the LiveStreamRecordManager APIs. See Record live streams in Wowza Streaming Engine.

For the Live and Live HTTP Origin application types in Wowza Streaming Engine Manager, you can select the Record all incoming streams option to record all streams published to the application by a live source. This recording option uses the live-record stream type and creates a recording with a file name that's the same as the source stream name in the application’s streaming file directory. To stop recording all source streams to these application types, you must clear the Record all incoming streams option and restart the application.

Finally, you can record IP camera streams (RTSP/RTP streams), SHOUTcast/Icecast streams, and streaming output from native RTP or MPEG-TS encoders using the MediaCaster system. The Stream Files and Startup Streams features in Wowza Streaming Engine Manager use the MediaCaster system to pull a stream from a stream source and make it available for streaming to all player technologies supported by Wowza Streaming Engine. You can configure these features to record the source streams instead by selecting an appropriate *-record stream type for the MediaCaster type (such as rtp-record for IP camera streams) and
the streams are recorded to the streaming file directory for the selected application. See MediaCasters, Stream files, and Startup Streams.

**Notes**

- The *-record stream types are the easiest to use but also give you the least amount of control. If you use this method, the entire duration of the published stream is recorded to a single file in the live application’s streaming file directory. If the stream source starts and stops, the file is versioned with a version number and a new file is started. You can control the container format used (MP4 or FLV) by specifying a stream name prefix in the stream source. If you specify the mp4: prefix, the stream is recorded to an MP4 (QuickTime) container. An MP4 container can only record H.264, AAC, and MP3 media data. If you specify the flv: prefix, the stream is recorded to an FLV container. The FLV container is the only option if you’re recording with Flash Player.

- If you use one of the *-record stream types and also configure the Incoming Streams feature for a live application to record a live source stream, two or more copies of the recording are created in the live application’s streaming file directory by default. The *-record stream types record the stream to a single file and the recorded file name is the same as the stream name. The Incoming Streams feature creates one or more recordings with file names that include the stream name and other information, depending on selected segmentation and versioning options.

- The WebcamRecording example in the Wowza Streaming Engine installation is a specialized way to record a remote live stream when using Adobe Flash Player. It uses the record stream type and built-in Flash Player capabilities to control the recording process.

**Virtual hosting**

Wowza Streaming Engine can be configured to run multiple virtual host (VHost) environments on a single server. This lets multiple users share a server in separate environments. Each VHost environment has its own set of configuration files, application folders, and log files and can be configured with its own system resource and streaming limitations. By default, Wowza Streaming Engine is configured with a single VHost named _defaultVHost_.

**Configuration files**

The VHosts.xml configuration file in the Wowza Streaming Engine [install-dir]/conf folder is used to define each of the VHost environments. The following items are required in VHosts.xml to define a VHost:

- **VHosts/VHost/Name.** The name of the VHost.

- **VHosts/VHost/ConfigDir.** The configuration directory for the VHost.

- **VHosts/VHost/ConnectionLimit.** The maximum number of simultaneous connections that the VHost supports. If this value is 0, the VHost can support an unlimited number of simultaneous connections.
Typical configuration

A typical VHosts.xml file for a VHost environment contains two VHosts. The following example shows the default VHost (_defaultVHost_) and a new VHost (_newVHost_):

```xml
<Root>
  <VHosts>
    <VHost>
      <Name>_defaultVHost_</Name>
      <ConfigDir>${com.wowza.wms.ConfigHome}</ConfigDir>
      <ConnectionLimit>0</ConnectionLimit>
    </VHost>
    <VHost>
      <Name>_newVHost_</Name>
      <ConfigDir>${com.wowza.wms.ConfigHome}/newVHost</ConfigDir>
      <ConnectionLimit>0</ConnectionLimit>
    </VHost>
  </VHosts>
</Root>
```
The directory structure for the VHosts in the above example would be:

```
[install-dir]
  [defaultVHost]
    [applications]
    [conf]
      Application.xml
      clientaccesspolicy.xml
      crossdomain.xml
      MediaCache.xml
      StartupStreams.xml
      Tune.xml
      VHost.xml
      admin.password
      publish.password
  [content]
  [keys]
  [logs]
  [transcoder]
  [newVHost]
    [applications]
    [conf]
      Application.xml
      clientaccesspolicy.xml
      crossdomain.xml
      MediaCache.xml
      StartupStreams.xml
      Tune.xml
      VHost.xml
      admin.password
      publish.password (Optional, see Notes below)
  [content]
  [keys]
  [logs]
  [transcoder]
```

**Notes**

- By default, all VHost environments share the `publish.password` file for the default VHost. You can use the **Source Authentication** feature in Wowza Streaming Engine Manager to set up unique publishing credentials for each VHost and the unique credentials are stored in this file.

  Alternatively, you can retain the `publish.password` file when you copy the `[install-dir]/conf` folder to your new VHost environment and then configure the `securityPublishPasswordFile` property for new VHost applications to reference this file for publishing credentials. If you do this, you can't use the **Source Authentication** feature in the manager to update the file. See [Configure security using Wowza Streaming Engine Manager](#).

- For more information about how to configure per-VHost logging, see [Logging](#).
VHosts are defined in the `[install-dir]/conf/VHosts.xml` file. Each VHost gets its own configuration directory structure with its own set of configuration files and `application`, `conf`, and `logs` folders. VHosts can be added, modified, and deleted through the `VHosts.xml` configuration file. If you change `VHosts.xml` while Wowza Streaming Engine is running, the changes take effect after restarting the server.

After adding a new VHost to `VHosts.xml` and creating its directory structure, select the new VHost on the `Server` tab in Wowza Streaming Engine Manager to manage it.

It's important to note that Wowza Streaming Engine only supports IP address/port-based virtual hosting. It doesn't support domain name-based virtual hosting. In `VHost.xml`, each VHost must define `HostPort` entries with unique IP address and port combinations that don't conflict with other VHosts that are defined on the server. The following combinations represent valid VHost port configurations:

```xml
<defaultVHost>
  <HostPort>
    <IpAddress>192.168.1.2</IpAddress>
    <Port>1935</Port>
  </HostPort>

<newVHost>
  <HostPort>
    <IpAddress>192.168.1.3</IpAddress>
    <Port>1935</Port>
  </HostPort>
</newVHost>

-or-

<defaultVHost>
  <HostPort>
    <IpAddress>192.168.1.2</IpAddress>
    <Port>1935</Port>
  </HostPort>

<newVHost>
  <HostPort>
    <IpAddress>192.168.1.2</IpAddress>
    <Port>1936</Port>
  </HostPort>
</newVHost>
```
To set up the IP address and port values, click the Server tab in Wowza Streaming Engine Manager, select a VHost in the list, and then click Virtual Host Setup in the contents panel. In the Virtual Host Setup page, click Edit to update the IP addresses and port values for the default host ports.

Server-side publishing (Stream and Publisher classes)

Wowza Streaming Engine includes the Stream class and the Publisher class for doing server-side publishing. The Stream class is a high-level server-side API for mixing live and VOD content on the fly into a single destination stream and lets you do television-style publishing. It also includes a package that enables creation of a server-side XML-based playlist. For more information about the Stream class, see Schedule streaming with Wowza Streaming Engine (StreamPublisher).

The Publisher class is a low-level publishing API that lets you inject raw compressed video and audio frames into Wowza Streaming Engine to create a custom live stream. See the Publisher class server API Javadocs ([install-dir]/documentation/serverapi) for the current detailed documentation.
Server Management and Monitoring

How do I manage and monitor Wowza Streaming Engine?

Wowza Streaming Engine Manager enables you to conveniently set up, manage, monitor, and measure video and audio streams using a web browser on your computer, tablet, or phone. The new browser-based application extends the programmatic and command line configuration and management of Wowza Streaming Engine, enabling publishers with a diverse range of technical abilities to have greater control and confidence when streaming video.

You can use Wowza Streaming Engine Manager with the latest versions of most modern web browsers that support HTML5 and CSS 3. We recommend that you use the Google Chrome browser.

Starting and stopping Wowza Streaming Engine Manager

Notes

- Wowza Streaming Engine must be started to use Wowza Streaming Engine Manager. See Starting and stopping the software.
- Wowza Streaming Engine Manager can't run as a service and in standalone mode at the same time.
- After starting Wowza Streaming Engine Manager, you can open it in a web browser with the URL http://[wowza-ip-address]:8088/enginemanager, where [wowza-ip-address] is the Wowza Streaming Engine IP address or domain name.
For more information about how to sign in to Wowza Streaming Engine Manager, see Managing sign-in credentials.

Start and stop Wowza Streaming Engine Manager as a service (Windows)

To start the service:

1. Press WIN key + R, type `services.msc` in the Run dialog box, and then click OK.
2. In the Services window, right-click Wowza Streaming Engine Manager 4.7.7, and then click Start.

To stop the service:

1. Press WIN key + R, type `services.msc` in the Run dialog box, and then click OK.
2. In the Services window, right-click Wowza Streaming Engine Manager 4.7.7, and then click Stop.

You can set Wowza Streaming Engine Manager to start automatically as a Windows service when Windows starts. To stop the service from starting automatically when Windows starts:

1. Press WIN key + R, type `services.msc` in the Run dialog box, and then click OK.
2. In the Services window, right-click Wowza Streaming Engine Manager 4.7.7, and then click Properties.
3. In the Properties dialog box, on the General tab, set Startup type to Manual.

Start and stop Wowza Streaming Engine Manager in standalone mode (Windows)

To start Wowza Streaming Engine Manager in standalone mode, make sure that the Wowza Streaming Engine Manager service is stopped (see above), and then do the following:

1. Press WIN key + R, type `cmd` in the Run dialog box, and then press Enter.
2. In the Command Prompt window, execute the following commands:

```bash
cd %WMSAPP_HOME%\manager\bin
startmgr.bat
```

To stop Wowza Streaming Engine Manager:

1. Press WIN key + R, type `cmd` in the Run dialog box, and then press Enter.
2. In the Command Prompt window, execute the following commands:

```bash
cd %WMSAPP_HOME%\manager\bin
shutdownmgr.bat
```
Start and stop Wowza Streaming Engine Manager as a service (OS X)

To start the service, double-click the **Start Services** application in
/Applications/WowzaStreamingEngine-4.7.7 or open a Terminal window and enter the following command:

```
sudo launchctl load -w
/Library/LaunchDaemons/com.wowza.WowzaStreamingEngineManager.plist
```

To stop the service, double-click the **Stop Services** application in
/Applications/WowzaStreamingEngine-4.7.7 or open a Terminal window and enter the following command:

```
sudo launchctl unload -w
/Library/LaunchDaemons/com.wowza.WowzaStreamingEngineManager.plist
```

**Note**

The **Start Services** and **Stop Services** applications also start and stop the Wowza Streaming Engine system service. See [Starting and stopping the software](#).

Start and stop Wowza Streaming Engine Manager in standalone mode (OS X)

To start Wowza Streaming Engine in standalone mode, double-click the **Start Standalone Mode** application in /Applications/WowzaStreamingEngine-4.7.7 or open a Terminal window and enter the following commands:

```
cd /Library/WowzaStreamingEngine-4.7.7/manager/bin
./startmgr.sh
```

To stop the manager, double-click the **Stop Standalone Mode** application in
/Applications/WowzaStreamingEngine-4.7.7 or open a Terminal window and enter the following commands:

```
cd /Library/WowzaStreamingEngine-4.7.7/manager/bin
./shutdownmgr.sh
```

**Note**

The **Start Standalone Mode** and **Stop Standalone Mode** applications also start and stop Wowza Streaming Engine in standalone mode. See [Starting and stopping the software](#).
Start and stop Wowza Streaming Engine Manager as a service (Linux)

**Note**

The operations in this section must be performed as the **root** user with **sudo** access.

To start the service, enter one of the following commands, depending on your Linux distribution:

```
sudo service WowzaStreamingEngineManager start
```

-or-

```
/etc/init.d/WowzaStreamingEngineManager start
```

To stop Wowza Streaming Engine Manager, enter:

```
sudo service WowzaStreamingEngineManager stop
```

-or-

```
/etc/init.d/WowzaStreamingEngineManager stop
```

**Note**

If these instructions don't apply to your Linux distribution, consult your Linux manual.

Start and stop Wowza Streaming Engine Manager in standalone mode (Linux)

To start the manager in standalone mode, open a Terminal window and enter the following commands:

```
cd /usr/local/WowzaStreamingEngine/manager/bin
./startmgr.sh
```

To stop Wowza Streaming Engine Manager, enter:

```
cd /usr/local/WowzaStreamingEngine/manager/bin
./shutdownmgr.sh
```

Managing sign-in credentials

The first time you start Wowza Streaming Engine Manager, you'll be asked to sign in with the case-sensitive user name and password that you created when you installed Wowza Streaming Engine. This account has administrator access to enable control of the Wowza Streaming Engine server through the manager. However, it doesn't provide access to
advanced property, server listener, and module settings, which are reserved for expert Wowza Streaming Engine users.

After you sign in, you can enable access to the advanced settings for the default administrator account and add accounts for other users. You can create additional user accounts with both administrative and read-only access.

**To enable access to advanced settings for the default administrator account:**

1. In Wowza Streaming Engine Manager, click the **Server** tab and then click **Users** in the contents panel.
2. On the **Users** page, click the user name for the administrator account in the **Users** list.
3. Click **Edit**, and then select the **Allow access to advanced properties and features** check box.
4. (Optional) Enter a new password in the **Password** and **Confirm Password** fields. The password values are case-sensitive.
5. Click **Save**. As the signed-in user, you'll be signed-out automatically and must sign in again.

You can also enable access to the advanced settings for the default administrator account by updating the `[install-dir]/conf/admin.password` file using a text editor. For example, to specify that the Admin user can access the advanced settings, specify the `advUser` group as shown in the following example:

```
# Admin password file (format [username][space][password][space][group])
#username password group|group
Admin AdminPassword admin|advUser
```

Administrators can create accounts for other users with full administrative access to Wowza Streaming Engine Manager or with read-only privileges.
To create new user accounts:
1. In Wowza Streaming Engine Manager, click the Server tab and then click Users in the contents panel.
2. On the Users page, click Add User.
3. Enter a name for the user in User Name and a password for the user in Password and Confirm Password fields. The user name and password values are case-sensitive.
4. Specify the access level (Read-Only or Administrator) for the new user by selecting the appropriate Access Level option.
5. To enable the new user to either manage (Administrator user) or view (Read-Only user) advanced settings, select the Allow access to advanced properties and features check box.
6. Click Add.

You can also add new user accounts by updating the [install-dir]/conf/admin.password file using a text editor. For example, to add the newAdmin and readOnly user accounts with access to advanced settings, edit the admin.password file as follows.

```
# Admin password file (format [username][space][password][space][group])
#username password group|group
Admin AdminPassword admin|advUser
newAdmin newAdminPassword admin|advUser
readOnly readOnlyPassword advUser
```

The readOnly user can view the advanced settings but can’t change them.

**Navigating in Wowza Streaming Engine Manager**

This section introduces the different parts of Wowza Streaming Engine Manager to orient you to the user interface. For more information, see Find your way around Wowza Streaming Engine Manager.
Click the tabs on the menu bar to access features that help you manage the server and virtual host (the Server tab) and create and manage live and video-on-demand application types (the Applications tab). Click the Help link to access articles and resources on the Wowza website that help you configure streaming workflows.

View information in the Status area about how the total number of connections (both source and playback connections) for the server (the Connections chart) and the total server resource consumption for CPU, Java heap, memory, and disk (the Usage chart). You can also see if the Transcoder, nDVR, and DRM features are licensed, and if they're enabled, which applications they're enabled for.

Use the information (IP address and port) shown in Application Connection Settings to publish a stream to the server from your encoder or camera.

Quickly verify that the server is up-and-running by using built-in test players to stream the sample.mp4 video file that's installed with the server software over multiple streaming protocols.

Use the Getting Started information to quickly jump to configuration areas in Wowza Streaming Engine Manager and to get more information about the Support resources that are available if you have problems.
Server configuration

The contents pane provides access to the following features that let you configure, manage, and monitor the server and virtual hosts (VHosts).

1. **Server Setup**: Configure settings for the Wowza Streaming Engine instance such as the instance name, available license keys, and enabling/disabling the Monitoring features for the server and its applications.

2. **Server Monitoring**: Monitor server resource consumption (CPU, memory, Java heap, and disk usage), source and playback connections, network throughput, and uptime. See Monitor server connections, load, and application statistics in Wowza Streaming Engine.

3. **Virtual Host Setup**: Manage virtual hosting environments on the server. By default, the Wowza Streaming Engine software ships with a single VHost environment named _defaultVHost_; however, you can add more VHost environments and manage them separately with this feature. See Virtual hosting.

4. **Virtual Host Monitoring**: Monitor VHost source and playback connections, network throughput, and uptime. See Monitor server connections, load, and application statistics in Wowza Streaming Engine.

5. **Transcoder**: Monitor the number of concurrent live source streams ingested by the Transcoder and add, modify, and delete the Transcoder templates. See Use Wowza
Transcoder.

Media Cache: Configure the read-through caching mechanism that enables scaling of VOD streams by re-streaming VOD file sources from HTTP-based servers that support HTTP/1.1 range requests and from network-attached file systems. See Scale video-on-demand streaming with Wowza Streaming Engine Media Cache.

Users: Set up and manage administrator and read-only user accounts for Wowza Streaming Engine Manager. See Managing sign-in credentials.

Source Authentication: Create and manage case-sensitive user names and passwords that RTMP-based and RTSP-based encoders and cameras can use to connect and publish a live stream if the live application requires authentication.

Performance Tuning: Adjust server performance settings from the default values that are calculated when the server starts. See Tune Wowza Streaming Engine for optimal performance.

Logs: View Wowza Streaming Engine and Wowza Streaming Engine Manager log files. Filtering and display options let you customize what you see in the UI, and you can download large log files to a compressed (zipped) folder for offline viewing. See View log messages in Wowza Streaming Engine Manager.

About: View information about the Wowza Streaming Engine platform such as the installed Wowza Streaming Engine software version and license and the installed version of Java.

Startup Streams: Pull live IP camera streams (RTSP/RTP streams), SHOUTcast/Icecast streams, and streams from native RTP or MPEG-TS encoders and start them automatically when the VHost starts. See Startup Streams.

Stream Files: Replace (alias) complex stream names that are published to Wowza Streaming Engine server from sources such as IP Camera streams (RTSP/RTP streams), SHOUTcast/Icecast streams, and streams from native RTP or MPEG-TS encoders. See Stream files.

SMIL Files: Create Synchronized Multimedia Integration Language (SMIL) files that organize streams of various bitrates into groups for HTTP adaptive bitrate streaming. See Stream adaptive-bitrate content in Wowza Streaming Engine.

When you click a server feature in the contents panel, a page is displayed that enables you to configure the feature settings. Advanced settings for fine-tuning the server configuration are available for some of the server features on Properties and Server Listeners tabs. These tabs are only available to users with advanced permissions. See
3 Some features have buttons in the upper-right corner that provide additional functionality. Some server-level features let you restart the server and stop and restart the VHost.

4 The Help panel provides details about how to configure the controls on the feature page. Toggle the panel’s visibility by clicking Hide Help or Show Help.

**Application types**

An *application* is a set of configuration options in Wowza Streaming Engine that supports a specific use case for the delivery of streaming content. To add applications in Wowza Streaming Engine Manager, click the **Applications** tab and then click **Add Application**.

In the **Add Application** page that’s displayed, you can add applications for six streaming use cases.
<table>
<thead>
<tr>
<th>Application Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live</td>
<td>Use this application to deliver live streams to players (single server) or as an origin server to deliver live streams to other servers running Wowza Streaming Engine to scale content delivery to a large number of players.</td>
</tr>
<tr>
<td>VOD</td>
<td>Use this application to stream video-on-demand files to players (single server).</td>
</tr>
<tr>
<td>Live Edge</td>
<td>Use this application to ingest live streams from a live application on an origin server that's running Wowza Streaming Engine. This application is then used to deliver the live streams to players (single server).</td>
</tr>
<tr>
<td>VOD Edge</td>
<td>Use this application to ingest video on demand files from a Media Cache source. This application is then used to stream the VOD files to players (single server).</td>
</tr>
<tr>
<td>Live HTTP Origin</td>
<td>Use this application to deliver live streams to an HTTP caching infrastructure using HTTP streaming protocols (MPEG-DASH, Apple HLS, Adobe HDS, and Microsoft Smooth Streaming).</td>
</tr>
<tr>
<td>VOD HTTP Origin</td>
<td>Use this application to deliver video on demand files to an HTTP caching infrastructure using HTTP streaming protocols (MPEG-DASH, Apple HLS, Adobe HDS, and Microsoft Smooth Streaming).</td>
</tr>
</tbody>
</table>

To add an application, click the **Application Type** in the page that corresponds to your needs, enter a name for the application in the **New Application** dialog box, and then click **Add**. Single instances of a live application type (named **live**) and an on-demand application type (named **vod**) are included in the default installation of Wowza Streaming Engine.
The contents panel provides access to the following features that let you configure, manage, and monitor the different application types.

**Application Setup:** Modify application settings such as the playback types (HTTP streamers and packetizers), default content storage location, closed-captioning options, and other settings. Some settings vary by application type.

**Monitoring:** Monitor application source and playback connections, network throughput, and uptime. See Monitor server connections, load, and application statistics in Wowza Streaming Engine.

**Sources (Live):** Get connection information for encoders and cameras that publish a stream to this application. If you're viewing this page on your iOS or Android mobile device that has the Wowza GoCoder™ encoding app installed, you can automatically configure the GoCoder app to publish a stream to this application. Wowza Streaming
Engine supports integrated configuration of additional live sources provided by Works With Wowza partners. You can connect many other live sources to live Wowza Streaming Engine applications, but you must configure the connection settings manually. See [Connect a live source to Wowza Streaming Engine](#).

**Stream Files**: Replace (alias) complex stream names that are published to the application from sources such as IP camera streams (RTSP/RTP streams), SHOUTcast/Icecast streams, and streams from native RTP or MPEG-TS encoders. See [Stream files](#).

**Incoming Streams**: View details about live streams that are published to this application and record them to VOD files for later playback. See [Record live streams in Wowza Streaming Engine](#).

**Wowza Player**: Send your live or on-demand Apple HLS stream URL to Wowza Player Builder, and then use Player Builder settings to customize your player and generate player embed code for your webpage or web application. See [Get started with Wowza Player](#).

**Stream Targets**: Send live streams to CDNs, streaming servers, streaming services, and multicast networks for distributed delivery. See [Distribute live streams](#).

**Source Security**: Configure options for securing RTMP and RTSP-based source connections to this application (for example, from RTMP-based encoders).

**Playback Security**: Configure options for securing playback connections to a Wowza Streaming Engine server. For example, require a secure RTMP connection, specify a security token ("shared secret"), and restrict playback to specific IP addresses.

**SMIL Files**: Create Synchronized Multimedia Integration Language (SMIL) files that organize streams of various bitrates into groups for HTTP adaptive bitrate streaming. See [Stream adaptive-bitrate content with Wowza](#).
Streaming Engine.

nDVR: Configure DVR playback of live streams using the nDVR feature. See nDVR.

Transcoder: Configure transcoding of live streams to suit desired playback devices using Wowza Transcoder. See Use Wowza Transcoder.

DRM: Integrate with DRM Key Management Service partners to enable on-the-fly DRM encryption of premium live and VOD content for a variety of playback devices. See Stream encryption with DRM.

2 When you click an application or one of its features in the contents pane, a page is displayed that enables you to configure the application or feature settings. Advanced settings for fine-tuning the configuration are available for the application and some application features on Properties and Modules tabs. These tabs are only available to users with advanced permissions. See Advanced properties and settings.

3 Most application and feature pages have buttons in the upper-right corner that provide additional functionality. You can access test players to test your streams, copy application settings to create a new application with identical settings, restart an application, and delete an application.

4 The Help panel provides details about how to configure the controls on the application or feature page. Toggle the panel’s visibility by clicking Hide Help or Show Help.

Test players

Wowza Streaming Engine Manager provides test players for all of the live and on-demand application types so that you can test an application's streaming configuration. To access the test players, click the Test Players button in the upper-right corner of the application or feature page. Then in the Test Players dialog box, click the tab for the streaming protocol that you've configured for the application and want to test.
The test players for live applications are preconfigured to play a live stream named **myStream** from the local Wowza Streaming Engine instance.

If you configured your encoder or camera to publish a stream to the live application with a different stream name, be sure to substitute it in place of **myStream** in the **Stream** box.
The test players for on demand applications are preconfigured to play the \texttt{[install-dir]/content/sample.mp4} video file that installs with Wowza Streaming Engine.

If you want to use your own VOD file, you can copy it to the \texttt{[install-dir]/content} root folder and substitute its file name for \texttt{sample.mp4} in the Media File Name box. If your custom VOD file isn't stored in the \texttt{[install-dir]/content} root folder, you must add the default application instance name to the playback URL. For example, if the \texttt{sample.mp4} video file is in \texttt{[install-dir]/myVideos}, enter \texttt{vod/_definst_/myVideos} in the Application box.

\begin{verbatim}
Note
The test players can't display closed captions or play encrypted streams. DVR playback is only supported by the Adobe HDS, Apple HLS, and Microsoft Smooth Streaming test players. If you change the default stream values to playback a new stream, you may need to restart the test players.
\end{verbatim}
Advanced properties and settings

Advanced settings for fine-tuning the server and application configuration are available in Wowza Streaming Engine Manager. Some server features have advanced settings on Properties and Server Listener tabs to adjust the server configuration while applications and some application features have Properties and Modules tabs to adjust the application configuration. The tabs that provide access to the advanced properties and settings aren't visible unless the signed-in user has advanced permissions. Administrators with advanced permissions can configure the advanced properties and settings while read-only users can’t change the advanced properties and settings. See Managing sign-in credentials.

Properties pages may have many properties that you can configure, so they’re organized into categories. Click a link in the Quick Links area at the top of the page to jump to the associated property settings. For example, click Closed Captions:
To jump to the Closed Captions property settings for an application:

Many articles on the Wowza docs website prescribe custom properties for tuning the server and applications and to add advanced functionality. Each article describes how to add the custom properties using the Custom Properties area on a Property tab:

See Properties.
Server Administration

How do I configure, manage, and deploy Wowza Streaming Engine?

Wowza Streaming Engine can be run standalone from a command shell or installed as a system service. Running standalone is best for developing custom Wowza Streaming Engine applications because the server can be started and stopped quickly and server log messages can be viewed immediately in the console window. Running as a system service is more often used for server deployments where the server must continue to run after you log off the computer or must be automatically started when the computer is rebooted.

Configuring SSL and RTMPS

Wowza Streaming Engine supports Secure Sockets Layer (SSL)—RTMPS (RTMP over SSL) and HTTPS (HTTP over SSL)—streaming protection. SSL allows web browsers and web servers to communicate over a secure connection, with the encrypted data being sent and received in both directions. You can use Wowza StreamLock AddOn to get a free 256-bit SSL certificate, you can get an SSL certificate from a certificate authority, or you can create a certificate yourself (a self-signed SSL certificate).

Notes

- For information on getting an SSL certificate from Wowza, see Get SSL certificates from the Wowza Streaming Engine StreamLock service.
- For information on getting an SSL certificate from a certificate authority, see Request an SSL certificate for Wowza Streaming Engine from a certificate authority.
- For information on creating a self-signed SSL certificate, see Create a self-signed SSL certificate for Wowza Streaming Engine.
Logging

Wowza Streaming Engine uses the Apache log4j logging utility as its logging implementation. The log4j logging system provides ample functionality for log formatting, log rolling, and log retrieval for most applications. By default, Wowza Streaming Engine is configured to log basic information to the server console and detailed information in the W3C Extended Common Log Format (ECLF) to a log file. Java messaging is also captured in the log files to help monitor and aid troubleshooting. The log files are written to the [install-dir]/logs folder.

For information about common log messages and suggestions for resolution, see Troubleshoot error messages in Wowza Streaming Engine.

Logging fields

Wowza Streaming Engine can generate the following logging fields:

<table>
<thead>
<tr>
<th>Field name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>c-client-id</td>
<td>Client ID number assigned by the server to the connection</td>
</tr>
<tr>
<td>c-ip</td>
<td>Client connection IP address</td>
</tr>
<tr>
<td>c-proto</td>
<td>Client connection protocol: http (Apple HLS), http (Smooth Streaming), rtmp, rtmpe, rtmps (HTTP-1.1), rtmpt (HTTP-1.1), rtmpte (HTTP-1.1)</td>
</tr>
<tr>
<td>c-referrer</td>
<td>URL of the Flash movie that initiated the connection to the server</td>
</tr>
<tr>
<td>c-user-agent</td>
<td>Version of the Flash client that initiated the connection to the server</td>
</tr>
<tr>
<td>cs-bytes</td>
<td>Total number of bytes transferred from client to server (cumulative)</td>
</tr>
<tr>
<td>cs-stream-bytes</td>
<td>Total number of bytes transferred from client to server for stream x-stream-id (cumulative)</td>
</tr>
<tr>
<td>cs-uri-query</td>
<td>Query parameter for stream x-stream-id</td>
</tr>
<tr>
<td>cs-uri-stem</td>
<td>Full connection string for stream x-stream-id (excludes query parameters)</td>
</tr>
<tr>
<td>date</td>
<td>Date of log event</td>
</tr>
<tr>
<td>s-ip</td>
<td>IP address of the server that received this event</td>
</tr>
<tr>
<td>s-port</td>
<td>Port number through which the server received this event</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>s-uri</td>
<td>Full connection string on which the server received this event</td>
</tr>
<tr>
<td>sc-bytes</td>
<td>Total number of bytes transferred from server to client (cumulative)</td>
</tr>
<tr>
<td>sc-stream-bytes</td>
<td>Total number of bytes transferred from server to client for stream x-stream-id (cumulative)</td>
</tr>
<tr>
<td>time</td>
<td>Time of log event</td>
</tr>
<tr>
<td>tz</td>
<td>Time zone of log event</td>
</tr>
<tr>
<td>x-app</td>
<td>Name of the application from which the event was generated</td>
</tr>
<tr>
<td>x-appinst</td>
<td>Name of the application instance from which the event was generated</td>
</tr>
<tr>
<td>x-category</td>
<td>Log event category (server, vhost, application, session, stream)</td>
</tr>
<tr>
<td>x-comment</td>
<td>Extra comment about the log event</td>
</tr>
<tr>
<td>x-ctx</td>
<td>Extra data about the context of the log event</td>
</tr>
<tr>
<td>x-duration</td>
<td>Time, in seconds, that this event occurred within the lifetime of the x-category object</td>
</tr>
<tr>
<td>x-event</td>
<td>Log event (see Logging events)</td>
</tr>
<tr>
<td>x-file-ext</td>
<td>File extension of stream x-stream-id</td>
</tr>
<tr>
<td>x-file-length</td>
<td>File length, in seconds, of stream x-stream-id</td>
</tr>
<tr>
<td>x-file-name</td>
<td>Full file path of stream x-stream-id</td>
</tr>
<tr>
<td>x-file-size</td>
<td>File size, in bytes, of stream x-stream-id</td>
</tr>
<tr>
<td>x-severity</td>
<td>Log event severity (DEBUG, INFO, WARN, ERROR, FATAL)</td>
</tr>
<tr>
<td>x-sname</td>
<td>Name of stream x-stream-id</td>
</tr>
<tr>
<td>x-sname-query</td>
<td>Query parameters of stream x-stream-id</td>
</tr>
<tr>
<td>x-spos</td>
<td>Position, in milliseconds, within the media stream</td>
</tr>
<tr>
<td>x-status</td>
<td>Log event status (see Logging status values)</td>
</tr>
<tr>
<td>x-stream-id</td>
<td>Stream ID number assigned by the server to the stream object</td>
</tr>
</tbody>
</table>
### x-suri
Full connection string for stream `x-stream-id` (includes query parameters)

### x-suri-query
Query parameter for connection string

### x-suri-stem
Full connection string for stream `x-stream-id` (excludes query parameters)

### x-vhost
Name of the virtual host from which the event was generated

---

**Logging events**

Wowza Streaming Engine software can generate the following logging events:

<table>
<thead>
<tr>
<th>Event name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>announce</td>
<td>RTSP Session Description Protocol (SDP) ANNOUNCE</td>
</tr>
<tr>
<td>app-start</td>
<td>Application instance start</td>
</tr>
<tr>
<td>app-stop</td>
<td>Application instance shutdown</td>
</tr>
<tr>
<td>comment</td>
<td>Comment</td>
</tr>
<tr>
<td>connect</td>
<td>Connection result</td>
</tr>
<tr>
<td>connect-burst</td>
<td>Connection accepted in burst zone</td>
</tr>
<tr>
<td>connect-pending</td>
<td>Connection pending approval by application and license manager</td>
</tr>
<tr>
<td>create</td>
<td>Media or data stream created</td>
</tr>
<tr>
<td>decoder-audio-start</td>
<td>Audio decoding has started for a transcoded stream</td>
</tr>
<tr>
<td>decoder-audio-stop</td>
<td>Audio decoding has stopped for a transcoded stream</td>
</tr>
<tr>
<td>decoder-video-start</td>
<td>Video decoding has started for a transcoded stream</td>
</tr>
<tr>
<td>decoder-video-stop</td>
<td>Video decoding has stopped for a transcoded stream</td>
</tr>
<tr>
<td>destroy</td>
<td>Media or data stream destroyed</td>
</tr>
<tr>
<td>disconnect</td>
<td>Client (session) disconnected from server</td>
</tr>
<tr>
<td>encoder-audio-start</td>
<td>Audio encoding has started for a transcoded stream</td>
</tr>
<tr>
<td>encoder-audio-stop</td>
<td>Audio encoding has stopped for a transcoded stream</td>
</tr>
<tr>
<td>encoder-video-start</td>
<td>Video encoding has started for a transcoded stream</td>
</tr>
<tr>
<td>encoder-video-stop</td>
<td>Video encoding has stopped for a transcoded stream</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>pause</td>
<td>Playback has paused</td>
</tr>
<tr>
<td>play</td>
<td>Playback has started</td>
</tr>
<tr>
<td>publish</td>
<td>Start stream publishing</td>
</tr>
<tr>
<td>record</td>
<td>Start stream recording</td>
</tr>
<tr>
<td>recordstop</td>
<td>Stop stream recording</td>
</tr>
<tr>
<td>seek</td>
<td>Seek has occurred</td>
</tr>
<tr>
<td>setbuffertime</td>
<td>Client call to <code>NetStream.setBufferTime(secs)</code> logged in milliseconds</td>
</tr>
<tr>
<td>setstreamtype</td>
<td>Client call to <code>netConnection.call(&quot;setStreamType&quot;, null, &quot;[streamtype&quot;]&quot;)</code></td>
</tr>
<tr>
<td>server-start</td>
<td>Server start</td>
</tr>
<tr>
<td>server-stop</td>
<td>Server shutdown</td>
</tr>
<tr>
<td>stop</td>
<td>Playback has stopped</td>
</tr>
<tr>
<td>unpause</td>
<td>Playback has resumed from pause</td>
</tr>
<tr>
<td>unpublish</td>
<td>Stop stream publishing</td>
</tr>
<tr>
<td>vhost-start</td>
<td>Virtual host start</td>
</tr>
<tr>
<td>vhost-stop</td>
<td>Virtual host shutdown</td>
</tr>
</tbody>
</table>

### Logging status values

Wowza Streaming Engine can generate the following logging status values:

<table>
<thead>
<tr>
<th>Status value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Pending or waiting (for approval)</td>
</tr>
<tr>
<td>200</td>
<td>Success</td>
</tr>
<tr>
<td>302</td>
<td>Rejected by application with redirect information</td>
</tr>
<tr>
<td>400</td>
<td>Bad request</td>
</tr>
<tr>
<td>401</td>
<td>Rejected by application</td>
</tr>
<tr>
<td>413</td>
<td>Rejected by license manager</td>
</tr>
<tr>
<td>500</td>
<td>Internal error</td>
</tr>
</tbody>
</table>
Logging configuration

Logging is configured in the `conf/log4j.properties` properties file. The log4j logging system has many logging configuration options. This section covers the basic options for enabling and disabling different logging fields, events, and categories.

The following example shows a basic `log4j.properties` file for a Wowza Streaming Engine instance:

```properties
log4j.rootCategory=INFO, stdout, serverAccess, serverError

# Console appender
log4j.appender.stdout=org.apache.log4j.ConsoleAppender
log4j.appender.stdout.layout=com.wowza.wms.logging.ECLFPatternLayout
log4j.appender.stdout.layout.Fields=x-severity,x-category,x-event,x-ctx,x-comment
log4j.appender.stdout.layout.OutputHeader=false
log4j.appender.stdout.layout.QuoteFields=false
log4j.appender.stdout.layout.Delimeter=space

# Access appender
log4j.appender.serverAccess=org.apache.log4j.WowzaDailyRollingFileAppender
log4j.appender.serverAccess.DatePattern='.'yyyy-MM-dd
log4j.appender.serverAccess.layout=com.wowza.wms.logging.ECLFPatternLayout
log4j.appender.serverAccess.layout.Fields=x-severity,x-category,x-event;date,time,c-client-id,c-ip,c-port,cs-bytes,sc-bytes,x-duration,x-sname,x-stream-id,sc-stream-bytes,cs-stream-bytes,x-file-size,x-file-length,x-ctx,x-comment
log4j.appender.serverAccess.layout.OutputHeader=true
log4j.appender.serverAccess.layout.QuoteFields=false
log4j.appender.serverAccess.layout.Delimeter=tab

# Error appender
log4j.appender.serverError=org.apache.log4j.WowzaDailyRollingFileAppender
log4j.appender.serverError.DatePattern='.'yyyy-MM-dd
log4j.appender.serverError.layout=com.wowza.wms.logging.ECLFPatternLayout
log4j.appender.serverError.layout.Fields=x-severity,x-category,x-event;date,time,c-client-id,c-ip,c-port,cs-bytes,sc-bytes,x-duration,x-sname,x-stream-id,sc-stream-bytes,cs-stream-bytes,x-file-size,x-file-length,x-ctx,x-comment
log4j.appender.serverError.layout.OutputHeader=true
log4j.appender.serverError.layout.QuoteFields=false
log4j.appender.serverError.layout.Delimeter=tab
log4j.appender.serverError.Threshold=WARN
```
Note
Always use forward slashes when referring to file paths, even on Windows.

The first statement in the `log4j.properties` file sets the logging level to INFO and defines three appenders: stdout, serverAccess, and serverError. Setting the logging level to INFO configures the logging mechanism such that it only logs events with a severity of INFO or higher. The logging severity in ascending order is: DEBUG, INFO, WARN, ERROR, and FATAL. To log all events, set the logging level to DEBUG.

Appender properties allow you to control the way that log information is formatted and filtered. The following table shows some of the important properties.

<table>
<thead>
<tr>
<th>Property name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CategoryExclude</td>
<td>Comma-separated list of logging categories. Only log events whose category isn't in this list are logged.</td>
</tr>
<tr>
<td>CategoryInclude</td>
<td>Comma-separated list of logging categories. Only log events with the specified categories are logged.</td>
</tr>
<tr>
<td>Delimiter</td>
<td>The delimiter character to use between field values. Valid values are tab, space, or the actual delimiter character.</td>
</tr>
<tr>
<td>EventExclude</td>
<td>Comma-separated list of logging categories. Only log events whose event name isn't in this list are logged.</td>
</tr>
<tr>
<td>EventInclude</td>
<td>Comma-separated list of logging events. Only log events with the specified event name are logged.</td>
</tr>
<tr>
<td>Field</td>
<td>Comma-delimited list of fields to log.</td>
</tr>
<tr>
<td>OutputHeader</td>
<td>Boolean value (true/false) that instructs the logging system to write out a W3C ECLF header whenever the server is started.</td>
</tr>
<tr>
<td>QuoteFields</td>
<td>Boolean value (true/false) that instructs the logging system to wrap field data in double quotes.</td>
</tr>
</tbody>
</table>

For more information about how to configure the log4j specific properties such as log file rolling and additional log appender types, see the Log4j website.
Wowza Streaming Engine can also be configured to generate logs on a per-application and per-virtual host basis. These configurations are included, but commented-out, at the bottom of the default `[install-dir]/conf/log4j.properties` file. The first commented-out section includes configuration for per-application logging. The second commented-out section includes configuration for per-virtual host logging. To enable either of these features, remove the comments (# sign at the beginning of each of the lines) from the section.

The per-application logging generates log files using the following directory structure:

```
[install-dir]/logs/[vhost]/[application]/wowzastreamingengine_access.log
[install-dir]/logs/[vhost]/[application]/wowzastreamingengine_error.log
[install-dir]/logs/[vhost]/[application]/wowzastreamingengine_stats.log
```

The per-virtual host logging generates log files using the following directory structure:

```
[install-dir]/logs/[vhost]/wowzastreamingengine_access.log
[install-dir]/logs/[vhost]/wowzastreamingengine_error.log
[install-dir]/logs/[vhost]/wowzastreamingengine_stats.log
```

This method for generating log files can be very useful if you want to offer Wowza Streaming Engine as a shared service to several customers.
More resources

Where do I get step-by-step instructions?

The Wowza Streaming Engine documentation website has step-by-step instructions for configuring common streaming scenarios, as well as articles to help you learn about all of the features and capabilities of Wowza Streaming Engine. See any of these useful and popular articles to learn more using Wowza Streaming Engine.

- Set up video-on-demand streaming in Wowza Streaming Engine
- Set up live streaming using an RTMP-based encoder in Wowza Streaming Engine
- Set up live streaming using an RTSP/RTP-based encoder in Wowza Streaming Engine
- Publish and play a live stream (MPEG-TS based encoder) in Wowza Streaming Engine
- Connect a live source to Wowza Streaming Engine
- Set up and run Wowza Transcoder in Wowza Streaming Engine
- Set up and run Wowza nDVR in Wowza Streaming Engine
- Configure a live stream repeater in Wowza Streaming Engine
- Re-stream video from an IP camera (RTSP/RTP re-streaming) in Wowza Streaming Engine
- Stream over MPEG-DASH with Wowza Streaming Engine
- All Wowza Streaming Engine articles