



---

Wowza Media Server® 3

# Wowza Transcoder AddOn

## User's Guide



**Version: 3.6**

---

<http://www.wowza.com>

**This document is for information purposes only and in no way shall be interpreted or construed to create any warranties of any kind, either express or implied, regarding the information contained herein.**

### **Third Party Information**

This document contains links to third party websites that are not under the control of Wowza Media Systems, LLC ("Wowza") and Wowza is not responsible for the content on any linked site. If you access a third party website mentioned in this document, then you do so at your own risk. Wowza provides these links only as a convenience, and the inclusion of any link does not imply that Wowza endorses or accepts any responsibility for the content on third party sites.

Wowza is licensed by MPEGLA<sup>®</sup> under the MPEG-2 Patent Portfolio License, MPEG-4 Visual Patent Portfolio License and the MPEG-AVC Patent Portfolio License giving Wowza customers certain rights to use Wowza Transcoder AddOn. Your specific use of Wowza Media Server<sup>®</sup> 3.6 may require an additional license from MPEGLA. You are encouraged to consult with MPEGLA at <http://www.mpegla.com> or your legal counsel for assistance in determining whether you are required to obtain an additional license to use Wowza Media Server 3.6 for your specific use. This document also refers to other third party software that is not licensed, sold, distributed or otherwise endorsed by Wowza. Please ensure that any and all use of Wowza<sup>®</sup> software and third party software is properly licensed.

### **Trademarks**

Wowza, Wowza Media Systems, Wowza Media Server and related logos are either registered trademarks or trademarks of Wowza Media System, LLC in the United States and/or other countries.

Adobe and Flash are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

Microsoft and Silverlight are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

QuickTime, iPhone, iPad and iPod touch are either registered trademarks or trademarks of Apple, Inc. in the United States and/or other countries.

Other product names, logos, designs, titles, words or phrases mentioned may be third party registered trademarks or trademarks in the United States and/or other countries.

Third party trademarks are used solely to identify and describe third party products as being compatible with Wowza products. Wowza is in no way sponsored, endorsed by or otherwise affiliated with any such third party trademark owners.

### **Third Party Copyright Notices**

Apache Commons Lang: Copyright © 2001-2011, The Apache Software Foundation

Apache Commons Modeler Component: Copyright © 2002-2008, The Apache Software Foundation

Bouncy Castle Crypto APIs: Copyright © 2000 – 2008, Legion of the Bouncy Castle

Jackson JSON Parser: Copyright © 2009, FasterXML, LLC

Java ID3 Tag Library and JLayer 1.0 (classic): Copyright © 1991, 1999, Free Software Foundation, Inc.

Joda-Time version 2.1: Copyright © 2012, Joda.org.

Libgcc\_s-4 library and Libstdc++ library: Copyright © 2011, Free Software Foundation, Inc.

LibVA libraries: Copyright © 2007, Intel Corporation. All rights reserved.

Log4j and Mina: Copyright © 2006, The Apache Software Foundation

NVIDIA Video Codec SDK: Copyright © 2013, NVIDIA Corporation

Silver Egg Technology: Copyright © 2001, Silver Egg Technology

Speex Codec: Copyright © 2002-2003, Jean-Marc Valin/Xiph.Org Foundation

VideoEncoderH264VAAPImpl: Copyright © 2012, Intel Corporation. All Rights Reserved.

Vorbis/Ogg libraries: Copyright © 2011, Xiph.Org Foundation

WebM VP8 Codec libraries: Copyright © 2010, Google Inc. All rights reserved.

## Document History

Version	Description	Release date
Doc v3.0.0	Initial document release	
Doc v3.0.1	Updated Win install and PassThru descriptions	11-18-2011
Doc v3.0.2	Fixed link to Performance article	11-30-2011
Doc v3.1.0	Updated to version 3.1.0	03-29-2012
Doc v3.5.0	Updated to version 3.5.0	11-08-2012
Doc v3.6.0	Updated to version 3.6.0	05-28-2013

# Table of Contents

<b>Introduction .....</b>	<b>5</b>
<b>Installation .....</b>	<b>6</b>
Wowza Media Server editions .....	6
Entering a new or additional license key.....	7
Configuration files .....	8
<b>Features .....</b>	<b>9</b>
Video and audio codecs .....	9
Protocols and players .....	10
Hardware acceleration.....	10
Adaptive bitrate delivery .....	11
Overlays .....	13
Logging.....	14
Getting bitmap Images from Wowza Transcoder.....	14
Extending Wowza Transcoder AddOn.....	14
<b>Configuration .....</b>	<b>15</b>
Create application folder.....	15
Create configuration folder .....	16
Configure Application.xml for live streaming and transcoding .....	16
Configure template for transcoding or transrating.....	17
<b>Performance Tuning .....</b>	<b>21</b>
Template settings for bitrate and resolution.....	21
Number of transcoder templates.....	22
Hardware .....	22
Performance benchmarks.....	23

## Introduction

### *What is Wowza Transcoder AddOn?*

**W**owza Transcoder AddOn enables the ability to ingest a live stream, decode the video and audio, and then re-encode the stream for delivery to desired playback devices. The supported workflows include:

- Transcoding from selected non-H.264 video and non-AAC audio formatted streams to outbound H.263 or H.264 video and AAC audio. Multiple bitrate streams can be created from a single input stream.
- Transrating incoming H.264/AAC streams to multiple bitrate outbound streams.

The newly encoded multiple bitrate streams are key frame aligned with each other to enable adaptive bitrate delivery from Wowza Media Server for Real Time Messaging Protocol (RTMP), Adobe® HTTP Dynamic Streaming (HDS), Microsoft® Smooth Streaming, and Apple® HTTP Live Streaming (HLS). Single bitrate streaming is supported for all transport protocols, including RTSP/RTP and MPEG-TS.

Wowza Transcoder uses a template system to match the incoming stream to an encoding template that you can customize to control the encoding parameters of the resultant transcoded streams. H.264 streams can be delivered over any protocol supported by Wowza Media Server.

For the most up-to-date information, tutorials, and tips, see the **Articles** tab of the [Wowza Media Server Articles and Forums](#) webpage.

This document is meant to help you specifically with Wowza Transcoder AddOn. The [Wowza Media Server User's Guide](#) contains comprehensive information about Wowza Media Server.

## Installation

*What do I need to install and run Wowza Transcoder AddOn?*

**W**owza Transcoder AddOn is a part of the Wowza Media Server installer. This AddOn is supported only with Wowza Media Server installed on 64-bit versions of Windows® or Linux® operating systems. 64-bit Java runtime is also required. Wowza Transcoder AddOn is licensed separately from Wowza Media Server. See the [Wowza Media Server Editions](#) section in this document for applicable licensing details.

### Wowza Media Server editions

Wowza Media Server 3.6 comes in five editions: Trial, Monthly, Daily, Perpetual, and Developer.

Trial Edition	The free Trial Edition provides full, unrestricted functionality of Wowza Media Server 3.6 and AddOns, but is limited to 30 days of use from the date of issue. Wowza Transcoder streams contain audio/video watermarks. Other restrictions apply as described in the Wowza Media Software EULA.
Monthly/Daily Edition	These licenses provide full, unrestricted functionality of Wowza Media Server 3.6 and AddOns, and allow the use of an unlimited number of server instances and AddOns under a single license key. Fees apply for each server instance and AddOn in use. The Monthly and Daily Editions differ only in payment terms. The use of these Editions is further permitted on Amazon® Elastic Compute Cloud® (EC2) and other computing cloud environments. See the Wowza Media Software EULA for more information.
Perpetual Edition	The Perpetual Edition provides full, unrestricted functionality of Wowza Media Server 3.6, but requires separate license keys for each server. In addition, each AddOn feature is licensed separately. Wowza nDVR AddOn and Wowza DRM AddOn licenses provide unlimited connection capacity per instance. Each



	Wowza nDVR and Wowza DRM license must be used with a Wowza Media Server 3.6 Perpetual Edition license. Each Wowza Transcoder AddOn license is limited to one incoming channel (stream) and an unlimited number of outbound streams per the Wowza Media Server 3.6 Perpetual Edition license. Multiple Wowza Transcoder AddOn licenses can be stacked on a single Wowza Media Server 3.6 Perpetual Edition license for additional channel capacity. See the Wowza Media Software EULA for more information.
Developer Edition	The Developer Edition provides full, unrestricted functionality of Wowza Media Server 3.6 and AddOns, but is limited to 180 days of use from the date of issue, and is further limited to ten (10) concurrent connections with live streaming restricted to two (2) inbound and ten (10) total combined concurrent inbound and outbound streams. Wowza Transcoder streams contain audio/video watermarks. See the Wowza Media Software EULA for more information.

## Entering a new or additional license key

License keys for all Wowza® products, including Wowza Media Server 3.6 and AddOns, are stored in **[install-dir]/conf/Server.license**.

%WMSCONFIG_HOME%\conf\Server.license	- Windows
/Library/WowzaMediaServer/conf/Server.license	- Mac OS X
/usr/local/WowzaMediaServer/conf/Server.license	- Linux/Unix

Trial, Daily, and Monthly Edition subscribers will have a single license key while Perpetual Edition users may have more than one key to enable purchased AddOns.

To add or change a license key, open the **Server.license** file in a text editor and enter each new license key on a new line. When the standalone server is restarted, the new license will take effect. The licenses are additive, so when adding additional licenses, be sure to retain the original license information in the file and add each new license key on its own new line. The order in which the keys are listed isn't important. The first and last five digits of the license key are displayed in the console window.

The following is an example **Server.license** file for a Perpetual Edition user with a Wowza Media Server license key, two Wowza Transcoder AddOn license keys, and one Wowza nDVR AddOn license key:

```
SVRP3-LaGpC-ZrTD9-F4Y3S-a9bR2-h5t3C
TRN23-Ry6qe-4mT8J-yKj2W-4N5sH-2Td3a
TRN13-y9Gj2-kneqT-2zjHp-Gadzb-N6fwa
DVR A3-k3r3R-nzxCB-ypjs5-Sk3y9-ahFdF
```

## Configuration files

Wowza Media Server is configured through a set of XML, configuration, and properties files in the `[install-dir]/conf` and `[install-dir]/transcoder` folders. Wowza Transcoder AddOn relies on this configuration information and correct server setup. For more information about how to configure and tune Wowza Media Server, see the [Wowza Media Server User's Guide](#) and [Wowza Media Server Configuration Reference](#). This section briefly describes the configuration files used with Wowza Transcoder.

## Wowza Transcoder template files

The `[install-dir]/transcoder/templates` folder contains the following sample template files.

- **transcode.xml:** Use this template when the source stream isn't H.264 video (such as MPEG-2) with non-AAC/MP3 audio and you want Wowza Transcoder to generate a full set of bitrate renditions for adaptive streaming delivery. When using this template, the source stream isn't included in the set of adaptive bitrate renditions available for playback.
- **transrate.xml:** Use this template when the source stream is H.264 video with either AAC or MP3 audio and you want Wowza Transcoder to generate lower bitrate renditions of the source stream for adaptive bitrate delivery. When using this template, the source stream is used as the high bitrate rendition and the lower bitrate renditions are key frame aligned to the source video stream.
- **audioonly.xml:** Use this template to ingest an H.264 video and Speex audio stream from Adobe Flash Player and convert the Speex audio format to AAC to make the stream compatible with additional player technologies.

After you modify a Wowza Transcoder template, the changes take effect immediately without restarting Wowza Media Server.

## Application configuration file

The configuration files are read during server startup. They can be directly edited using a standard text editor.

### Application configuration files

`[install-dir]\applications\Application.xml` - Application configuration

For more information about the configuration files, see the [Wowza Media Server Configuration Reference](#).

## Features

*What can I do with the Wowza Transcoder AddOn?*

**W**owza Transcoder AddOn provides multiple features for transcoding or transrating incoming streams (referred to as "channels") to outgoing streams with multiple bitrates that can be delivered over any transport protocol supported by Wowza Media Server.

### Video and audio codecs

Wowza Transcoder AddOn supports the following video and audio codecs:

From incoming channels:

#### Video decoding

- H.264
- MPEG-2
- MPEG-4 Part 2

#### Audio decoding

- AAC
- G.711 ( $\mu$ -law and A-law)
- MPEG-1 Layer 1/2
- MPEG-1 Layer 3 (MP3)
- Speex

For resulting outgoing streams:

#### Video encoding

- H.264
- H.263v2

## Audio encoding

- AAC

### Notes

- The non-H.264 video and non-AAC/MP3 audio codecs listed are supported for transcoding only. They aren't available for direct playback.
- The following MP3 sample rates are supported: 48000, 44100, and 32000
- H.263 video output isn't supported when using hardware acceleration.
- Instream CEA-608 closed caption data can be passed through Wowza Transcoder for delivery in Apple HLS streams to iOS-based devices. For more information, see [How to configure closed captioning for live streaming](#).

## Protocols and players

H.264 streams can be delivered over any protocol already supported by Wowza Media Server, including Real Time Messaging Protocol (RTMP), Microsoft Smooth Streaming, Apple HTTP Live Streaming (HLS), Real Time Streaming Protocol (RTSP), Adobe HTTP Dynamic Streaming (HDS), Real-time Transport Protocol (RTP), MPEG-2 Transport Streams (MPEG-TS), and more. For more information, see the [Wowza Media Server User's Guide](#).

This means newly encoded streams can be played back on many popular media players such as Adobe® Flash® Player, Microsoft® Silverlight® player, Apple® iPhone®, iPad® and iPod touch® and Apple QuickTime® player (version 10 and later), Android™ smartphones and tablets, and IPTV/OTT set-top boxes, among others.

## Hardware acceleration

Wowza Transcoder AddOn can be configured to take advantage of hardware acceleration, which is recommended but not required. If your configuration doesn't include hardware acceleration, then a built-in software encoder is invoked. You can use Wowza Media Server logging information to verify which Wowza Transcoder implementation is invoked. For more information, see [How to verify which Wowza Transcoder implementation is invoked](#).

### Windows

On Windows 64-bit operating systems, Wowza Transcoder AddOn can be configured to take advantage of the following hardware acceleration technologies:

- **Intel® Quick Sync Video.** For recommended workstation and server-level hardware specifications, see [Server Specifications for Intel Quick Sync acceleration with Wowza Transcoder AddOn](#).
- **NVIDIA® NVENC and NVIDIA CUDA®.** Wowza Media Server leverages the NVIDIA Encoder (*NVENC*) API to access the high-performance H.264 hardware video encoder introduced in graphics cards with the new [Kepler GPU architecture](#). NVENC-based video encoding is faster and consumes less power than legacy CUDA-based or CPU-based encoding, enabling accelerated transcoding with Wowza Transcoder AddOn at greater scale and speed. Wowza Transcoder is compatible with most NVIDIA graphics cards that support the legacy CUDA instruction set. For a list of supported NVIDIA graphics card that are compatible with Wowza Transcoder, see [Server Specifications for NVIDIA NVENC and NVIDIA CUDA acceleration with Wowza Transcoder AddOn](#).

### Note

To run Wowza Transcoder on 64-bit versions of the Windows Server operating system, the following server features are required:

- .NET Framework 3.5.1
- Desktop Experience

### Linux

On Linux 64-bit operating system distributions, Wowza Transcoder AddOn can be configured to take advantage of the following hardware acceleration technologies:

- **Intel Quick Sync Video.** Wowza Media Server 3.5 and 3.6 contain a preview version of the technology that supports Intel Quick Sync Video on Linux distributions. The final version will be available in a later release of Wowza Media Server. For more information, see [How to configure Quick Sync accelerated encoding on Linux](#).
- **NVIDIA NVENC.** For more information, see [How to configure NVIDIA NVENC accelerated encoding on Linux](#).

## Adaptive bitrate delivery

Wowza Transcoder AddOn is designed to make live adaptive bitrate delivery easy. Wowza Transcoder can ingest a single high bitrate live stream and create multiple lower bitrate renditions on-the-fly. These new renditions are key frame aligned to enable adaptive bitrate delivery. Wowza Transcoder uses a templating system to group streams into logical groups (called *Stream Name Groups*) for live adaptive bitrate delivery. Stream Name Groups serve the same purpose as a Synchronized Multimedia Integration Language (SMIL) file and either method can be used for playback of live streams.

Wowza Transcoder includes sample transcoder template files in the **[install-dir]/transcoder/templates** folder. In each template file, a Stream Name Group is defined in **Transcode/StreamNameGroups/StreamNameGroup** and Stream Name Group members are called out by their names defined in the **Encodes/Encode/Name** property. Stream Name Group members must be defined encode blocks within the same template file.

Each sample transcoder template file in **[install-dir]/transcoder/templates** includes Stream Name Group examples. The following is an example Stream Name Group from the **[install-dir]/transcoder/templates/transrate.xml** transcoder template file.

```
<StreamNameGroups>
  <StreamNameGroup>
    <Name>all</Name>
    <StreamName>${SourceStreamName}_all</StreamName>
    <Members>
      <Member>
        <EncodeName>source</EncodeName>
      </Member>
      <Member>
        <EncodeName>720p</EncodeName>
      </Member>
      <Member>
        <EncodeName>360p</EncodeName>
      </Member>
      <Member>
        <EncodeName>240p</EncodeName>
      </Member>
      <Member>
        <EncodeName>160p</EncodeName>
      </Member>
    </Members>
  </StreamNameGroup>
</StreamNameGroups>
```

Similar to the ease of defining multiple encode blocks, you can also define multiple groups. When customizing your template, you should define and successfully playback individual resultant streams before defining your group. For more information, see [Playback with Stream Name Groups](#).

For adaptive bitrate delivery, you can create new streams targeted at different types of users and playback to offer the best possible viewing experience given the user's device and bandwidth. For example, you can encode one stream for Android/iPhone 3GS (supports Baseline Profile Level 3.0 and lower), another stream for iPhone 4/iPad 2 (supports Main Profile Level 3.1 profile and lower), and a third stream for desktop or set-top boxes.

## Playback with Stream Name Groups

At playback time, the player decides which stream in a Stream Name Group is best suited for playback based on the stream metadata. Most player technologies do the right selection, but it isn't always perfect. Stream Name Group functionality in Wowza Transcoder allows adaptive bitrate streams to take advantage of this player feature. The

Stream Name Groups that are defined in a transcoder template file are available for playback using the **ngrp:** media type prefix:

To play using Apple HTTP Live Streaming (HLS):

```
http://[wowza-ip-address]:1935/live/ngrp:myStream_all/playlist.m3u8
```

To play using Adobe HTTP Dynamic Streaming (HDS):

```
http://[wowza-ip-address]:1935/live/ngrp:myStream_all/manifest.f4m
```

To play using Microsoft Smooth Streaming:

```
http://[wowza-ip-address]:1935/live/ngrp:myStream_all/Manifest
```

## Overlays

Wowza Transcoder AddOn provides the ability to apply graphic image overlays to both the decoded stream and each newly encoded individual stream.

### Static images

Static overlay images in JPEG, PNG, and BMP image formats can be applied to streams to achieve stationary image effects such as a watermark to your video. You can customize the location, size, alignment, and opacity of your overlay by setting **Overlays** properties in transcoder template files for decoded and encoded streams. For more information about how to overlay static images onto your video streams, see [How to set up and run Wowza Transcoder AddOn for live streaming](#).

### Dynamic images

In Wowza Media Server 3.5 and later, you can overlay dynamic images on top of video by using a Java-based API. Starting with a static image in GIF, JPEG, PNG, or BMP format, you can add text and configure animation sequences to achieve effects such as dynamic insertion of advertising, titling, sporting event scores, and so on. Dynamic transcode overlays can be manually configured or pre-programmed based on external events, making this a powerful tool for adding premium TV-like experiences. For details about how to create dynamic transcode overlays, see [How to add graphic overlays to live streams with Wowza Transcoder AddOn](#). The examples and classes in this article provide a starting point for development. More elaborate overlays are possible through custom development by expanding the examples or by creating custom classes.

#### Note

The dynamic transcode overlay feature supports manipulation of images and text to generate animation sequences. It doesn't support stream manipulation such as Picture-in-picture (PiP) or multi-stream compositing.

## Logging

Log files for Wowza Media Server and Wowza AddOns (including Wowza Transcoder AddOn) are located at `[install-dir]/logs`. Wowza Transcoder messages are logged separately to enable more generalized accounting information.

### Example logging messages

```
decoder-audio-start transcoder INFO 200 myStream {codec: AAC,
objectType: 2, sampleRate: 44100, channels: 2}
decoder-video-start transcoder INFO 200 myStream {codec: H264,
profile: 77, level: 31, frameSize: 1280x720, displaySize: 1280x720,
frameRate: 29.97}
encoder-audio-start transcoder INFO 200 myStream {name: "360p",
bitrate: 96000, codec: AAC, objectType: 0, sampleRate: 44100, channels: 2}
encoder-video-start transcoder INFO 200 myStream {name: "360p",
bitrate: 850000, codec: H264, profile: 77, level: 30, frameSize: 640x360,
displaySize: 640x360, frameRate: 29.97}
decoder-video-stop transcoder INFO 200 myStream
decoder-audio-stop transcoder INFO 200 myStream
encoder-video-stop transcoder INFO 200 myStream {name: "360p"}
encoder-audio-stop transcoder INFO 200 myStream {name: "360p"}
```

## Getting bitmap Images from Wowza Transcoder

A built-in HTTP Provider is available for use when Wowza Transcoder AddOn is actively transcoding the video portion of a stream. The HTTP Provider enables you to get a bitmap image (in either JPEG or PNG image file format) of a video frame from Wowza Transcoder. For more information, see [How to get thumbnail images from Wowza Transcoder with an HTTP Provider](#).

## Extending Wowza Transcoder AddOn

Wowza Media Server is built using Java technology. The server and AddOns can be extended by writing custom Java classes that are dynamically loaded at runtime. Server and AddOn extensions (also referred to as "modules") run at the full speed of the server. Wowza Media Server and Wowza Transcoder AddOn include a rich API to interact with and control the streaming and transcoding process. For more information, see the [Wowza Media Server Server-Side API](#) and refer to the `com.wowza.wms.transcoder.*` packages.



## Configuration

*How do I setup Wowza Media Server for transcoding?*

Configuring Wowza Media Server for use with Wowza Transcoder AddOn is easy. All that's required is a configured application and transcoder template file. This chapter describes the basic steps for setting up transcoding in the following sections:

- [Create application folder](#)
- [Create configuration folder](#)
- [Configure Application.xml for live streaming and transcoding](#)
- [Configure template for transcoding or transrating](#)

This chapter assumes that you're familiar with Wowza Media Server. For more information about how to configure Wowza Media Server, see the [Wowza Media Server User's Guide](#).

### Create application folder

A single application can be configured to deliver single bitrate or adaptive bitrate transcoded live streams to Adobe® Flash® Player, Microsoft® Silverlight®, Apple® iOS devices (iPhone®, iPad®, or iPod touch®) or Apple TV® digital media extender, Roku® and Amino set-top boxes, and RTSP/RTP-based players (including 3GPP smart phones and tablets, and Android™ devices) at the same time.

You can define an application by creating a folder named **[install-dir]/applications/[application-name]**. You may already have an application dedicated to live streaming that you can use or you can create a new application. The example in this chapter uses the **[install-dir]/applications/live** application folder.

## Create configuration folder

To configure your application, you must create a configuration folder named **[install-dir]/conf/[application-name]**. Be sure to use the same **[application-name]** that you used in **[install-dir]/applications**. The example in this chapter uses the **[install-dir]/conf/live** configuration folder.

## Configure Application.xml for live streaming and transcoding

Copy **[install-dir]/conf/Application.xml** to your configuration folder. Then open the newly copied **[install-dir]/conf/[application-name]/Application.xml** file in a text editor and make the changes that are described in this section to enable live streaming and transcoding. For additional details, see [Application.xml configuration](#).

### To enable live streaming

Set the **Streams/StreamType** property to **live**.

```
<StreamType>live</StreamType>
```

### To enable transcoding

Set the **Transcoder/LiveStreamTranscoder** property to **transcoder**.

```
<LiveStreamTranscoder>transcoder</LiveStreamTranscoder>
```

The **Transcoder** section in the **Application.xml** file looks like this:

```
<Transcoder>
  <!-- To turn on transcoder set to: transcoder -->
  <LiveStreamTranscoder></LiveStreamTranscoder>
  <!-- [templatename].xml or ${SourceStreamName}.xml -->
  <Templates>${SourceStreamName}.xml,transrate.xml</Templates>
  <ProfileDir>${com.wowza.wms.context.VHostConfigHome}/transcoder/profiles</ProfileDir>
  <TemplateDir>${com.wowza.wms.context.VHostConfigHome}/transcoder/templates</TemplateDir>
  <Properties>
  </Properties>
</Transcoder>
```

You can customize the template name, location, and specify more than one template. If multiple templates exist, Wowza Media Server will use the first template listed in **Transcoder/Templates** that exists.

For example, let's say that your stream name is **myStream** and you created a new template **[install-dir]/transcoder/templates/myStream.xml**. When a live stream named **myStream** is published, Wowza Transcoder will use the **myStream.xml** template. If this

template doesn't exist, then the default **[install-dir]/transcoder/templates/transrate.xml** template is used if it exists.

You can also create a template with a custom name and include it in the **Transcoder/Templates** property. If you want to always use this custom template, list it first. In addition, you can customize Wowza Transcoder behavior per application by specifying a different template name or by using a different stream name.

For more information about other properties in the **Application.xml** file, see the [Wowza Media Server User's Guide](#).

## Limiting transcoding to specific streams

You can specify which live streams are transcoded by using the **Transcoder/Templates** property in **Application.xml** or by using the Wowza Transcoder API.

### Application.xml

To configure Wowza Media Server to identify specific streams to be transcoded, use the source stream name as your template name in **Transcoder/Templates**:

```
<Templates>${SourceStreamName}.xml</Templates>
```

Then create and configure the corresponding transcoder template **[install-dir]/transcoder/templates/[source-stream-name].xml**.

### Wowza Transcoder API

This method uses the Wowza IDE and the Wowza Transcoder API to create a class that will only return the value of **true** for the targeted stream name that you want to encode.

```
appInstance.setLiveStreamTranscoderControl(ILiveStreamTranscoderControl  
liveStreamTranscoderControl)
```

For more information, see [How to control which streams get transcoded using server-side API](#).

## Configure template for transcoding or transrating

Transcoder templates enable you to customize the video and audio parameters to target multiple playback devices. The newly encoded multiple bitrate streams are key frame aligned with each other to enable adaptive bitrate delivery from Wowza Media Server for Real Time Messaging Protocol (RTMP), Adobe HTTP Dynamic Streaming (HDS), Microsoft Smooth Streaming, and Apple HTTP Live Streaming (HLS). Each application or each stream can be controlled with different settings.

Encode blocks define the parameters of the transcoded or transrated streams. Each encode block represents a resultant encoded stream. Based on your needs, you can have a single template with multiple encode blocks or you can have multiple templates. Be sure to take into account your configuration and available bandwidth when

determining how many encodes your server can handle. See the [Performance Tuning](#) chapter for more information.

## Sample templates and template parameters

The sample templates `[install-dir]/transcoder/templates/transcode.xml` and `[install-dir]/transcoder/templates/transrate.xml` cover the two most common workflows. By default, `Application.xml` uses `transrate.xml`. You should start with the sample templates using the default encoding implementation before using accelerated hardware or customizing your template. The template configuration is described in more detail in [How to set up and run Wowza Transcoder AddOn for live streaming](#).

## Enabling new encodes

Use the encode blocks in the sample templates as a guide. It's easy to enable or disable the sample encode blocks or to test new encode blocks by setting the first property `Encodes/Encode/Enable` to `true` or `false`. Be careful to test as you go and don't enable more encode blocks than needed.

## Using PassThru

If your source stream is already encoded with H.264 video and AAC audio and you don't want to make any changes to the stream, then it's not necessary to decode and re-encode the source file in order to playback. In this case, you should set the `Video/Codec` and/or `Audio/Codec` property to `PassThru` in the resultant stream encode. The video or audio stream is passed through to the resultant stream. Note that you can pass through the video, the audio, or both.

If the source stream is already encoded with H.264 video and you want to create a different bitrate, profile, resolution, or make any other change, then set the `Video/Codec` property to `H.264`, not `PassThru`.

The default `[install-dir]/transcoder/templates/transrate.xml` template file shows several sample encode blocks where the `Audio/Codec` property is set to `PassThru` because the source audio is already AAC, a supported playback audio codec for Wowza Media Server. The `Video/Codec` property is set to `H.264` because other properties are set to customize the resultant stream.

## H.263 encoding

Wowza Transcoder AddOn supports H.263 encoding for live video streams, enabling users to stream to older devices. To transcode source streams using the H.263v2 video codec, set the `Video/Codec` property in your transcoder template file to `H.263`.

**Note**

H.263 video output isn't supported when using hardware acceleration. If you set the **Video/Transcoder** property in your transcoder template file to one of the accelerated encoding options (**QuickSync**, **CUDA**, or **NVENC**), the setting will be ignored and the default MainConcept software encoder will be used to generate the H263-encoded video.

## Transcoding and audio bitrate

You must set the **Video/Codec** and the **Audio/Bitrate** properties when transcoding. If you forget to assign a value for **Audio/Bitrate**, a default value is assigned so that the encode of the resultant stream won't fail.

## Using profiles

For adaptive bitrate delivery, you can create new streams targeted at different types of users and playback to offer the best possible viewing experience given the user's device and bandwidth. For example, you can encode one stream for Android/iPhone 3GS (supports Baseline Profile Level 3.0 and lower), another stream for iPhone 4/iPad 2 (supports Main Profile Level 3.1 profile and lower), and a third stream for desktop or set-top boxes.

Set the **Video/Profile** property to **baseline** for:

- A mix of mobile devices (Android, iOS devices, and so on.)
- iPhone 3GS and older
- Earlier iPod touch devices

This profile will also work for newer iOS devices such as iPhone 4, iPad 2, and iPod touch (4<sup>th</sup> generation).

Set the **Video/Profile** property to **main** for:

- iPhone 4, iPad 2
- Desktop players
- Set-top boxes (Roku, Amino, and so on)
- High-end delivery

**Note**

Wowza Transcoder supports bi-directional frame (B-frame) encoding when using the **default** transcoder implementation and the **Main** profile. B-frame encoding isn't supported when using hardware acceleration. For more information, see [How to configure bi-directional frame \(B-frame\) support when using Wowza Transcoder](#).

## Performance Tuning

### *How do I tune Wowza Media Server for transcoding?*

It's very important that Wowza Media Server be tuned properly so that it can take best advantage of the available hardware resources. The default tuning of the server is sufficient for application development; however, it's not ideal for production use. Without proper tuning, the server under medium to heavy load may run out of resources and stop working properly. This chapter describes performance tuning considerations for Wowza Transcoder AddOn.

### Template settings for bitrate and resolution

Determining the ideal settings for your configuration is a balancing act based on multiple factors. Increasing the target bitrate will increase the quality. When you make this kind of change, keep in mind that clients must have enough bandwidth available to playback the higher bitrate stream. In addition to client bandwidth and how the resultant stream is played back (mobile device, desktop, and so on), the type of content and purpose also must be taken into consideration. For example, security camera settings for streaming a video of a busy street where audio isn't important would be different than settings for streaming an interview where there's little movement but audio quality is critical. Experimentation is usually required to determine the right balance of settings.

General areas to check are:

- Make sure that your deployed server running Wowza Media Server is tuned properly. For more information, see [Performance Tuning](#).
- Tune the Wowza Media Server computer to make best use of available CPU resources. Tuning guidelines are available in [Performance Tuning](#).
- Determine available server-to-client bandwidth by using the [bandwidth checker tool](#).

- Review the example encode blocks in the sample template files in **[install-dir]/transcoder/templates**. Each sample template file has example encode blocks that are optimized for different bitrates and playback devices. You can review and customize the parameters for your workflow.

## Number of transcoder templates

Whether you have multiple encode blocks in one template or multiple templates, performance isn't affected given the same number of incoming live streams and the same number of resultant streams.

## Hardware

Hardware acceleration is recommended, but not required for transcoding. When Wowza Media Server is invoked for the first time, it checks to see if hardware acceleration resources are available and records the results in Wowza Media Server logs. You can check the log files and then modify the **Encode/Video/Transcoder** property in template files to either use a supported hardware acceleration technology or use the default MainConcept software encoder if your configuration doesn't include hardware acceleration. For more information, see [How to verify which Wowza Transcoder implementation is invoked](#).

On Windows 64-bit operating systems, Wowza Transcoder can be configured to take advantage of the following hardware acceleration technologies:

- **Intel Quick Sync Video.** For recommended workstation and server-level hardware specifications, see [Server Specifications for Intel Quick Sync acceleration with Wowza Transcoder AddOn](#).
- **NVIDIA NVENC and NVIDIA CUDA.** Wowza Media Server leverages the NVIDIA Encoder (*NVENC*) API to access the high-performance H.264 hardware video encoder introduced in graphics cards with the new [Kepler GPU architecture](#). NVENC-based video encoding is faster and consumes less power than legacy CUDA-based or CPU-based encoding, enabling accelerated transcoding with Wowza Transcoder AddOn at greater scale and speed. Wowza Transcoder is compatible with most NVIDIA graphics cards that support the legacy CUDA instruction set. For a list of supported NVIDIA graphics card that are compatible with Wowza Transcoder, see [Server Specifications for NVIDIA NVENC and NVIDIA CUDA acceleration with Wowza Transcoder AddOn](#).

On Linux 64-bit operating system distributions, Wowza Transcoder AddOn can be configured to take advantage of the following hardware acceleration technologies:

- **Intel Quick Sync Video.** Wowza Media Server 3.5 and 3.6 contain a preview version of the technology that supports Intel Quick Sync Video on Linux



distributions. The final version will be available in a later release of Wowza Media Server. For more information, see [How to configure Quick Sync accelerated encoding on Linux](#).

- NVIDIA NVENC. For more information, see [How to configure NVIDIA NVENC accelerated encoding on Linux](#).

## Performance benchmarks

As a guideline for estimating transcoding performance for your transcoder configuration, see [Wowza Transcoder AddOn Performance Benchmark](#). This article presents performance benchmark numbers captured for software (default) encoding, Intel Quick Sync accelerated encoding, and NVIDIA CUDA accelerated encoding. Wowza® provides these benchmark numbers only as general guidance. Your results may vary depending on network traffic, source file composition, configuration, overall operating system overhead, and so on.