



Wowza Media Server® 3

Wowza Transcoder™ AddOn User's Guide



Version: 3.1

<http://www.wowza.com>

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What's New

Change	Description	Release Date
Initial Release	Document release	
Doc v1.0.1	Updated Win install and PassThru descriptions	November 18, 2011
Doc v1.0.2	Fixed link to Performance article	November 30, 2011
Doc v1.0.3	Updated to version 3.1	March 29, 2012

Introduction

What is Wowza Transcoder AddOn?

Wowza Transcoder AddOn provides the ability to ingest a live stream, decode the video and audio, and then re-encode the stream to suit the desired playback devices. The supported workflows include:

- Transcoding from selected non-H.264 video and non-AAC audio formatted streams to the outbound 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 will be key frame aligned with each other enabling adaptive bitrate delivery from Wowza Media Server 3 for Flash[®] RTMP or HTTP Dynamic Streaming (HDS), Silverlight[®] Smooth Streaming, and Apple[®] HLS. Single bitrate streaming is supported for all transport protocols, also 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 3.

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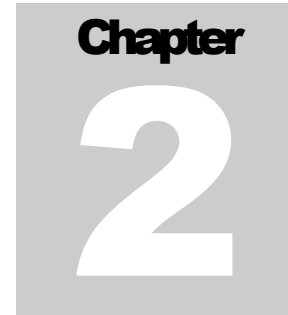
Note: Wowza Transcoder is supported only on Windows® 64-bit and Linux® 64-bit operating systems. 64-bit Java runtime is also required. This AddOn is not supported on Windows 32-bit, Linux 32-bit, Unix®, Solaris® or OS X® operating systems. With Windows 64-bit operating systems, Wowza Transcoder can be configured to take advantage of Intel® Quick Sync™ and Nvidia® CUDA® accelerated hardware.

Note: To run Wowza Transcoder on 64-bit Windows Server 2008, the following two components are required:

- .NET Framework 3.5.1 Feature
- Desktop Experience

For the most up to date information, tutorials and tips, visit the Article section of the [Wowza forums](#).

This document is meant to help users specifically with Wowza Transcoder AddOn. The [Wowza Media Server 3 User's Guide](#) contains comprehensive documentation for Wowza Media Server 3.



Installation

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

Wowza Transcoder AddOn is a part of the Wowza Media Server 3 installer. This AddOn is supported only with Wowza Media Server 3 installed on 64-bit Windows or Linux OS. Please consult the Wowza Media Server 3 Editions section below for applicable licensing details.

Wowza Media Server 3 Editions

Wowza Media Server 3 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 and AddOns, but is limited to 30 days of use from the date of issue and the Wowza Transcoder streams contain audio/video watermarks. Other restrictions apply as described in the Wowza Media Software EULA.
Monthly or Daily Editions	These licenses provide full, unrestricted functionality of Wowza Media Server 3 and AddOns, and allow the use of an unlimited number of server instances and AddOns under a single license key. 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 Wowza Media Software EULA for more information.
Perpetual Edition	The Perpetual Edition provides full, unrestricted functionality of Wowza Media Server 3, 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 Perpetual Edition license. Each Wowza Transcoder AddOn license is limited to two incoming channels (streams) and an unlimited number of outbound streams per Wowza Media Server 3 Perpetual Edition license. Multiple Wowza Transcoder AddOn licenses can be stacked on a single Wowza Media Server 3 Perpetual Edition license for additional channel capacity. See Wowza Media

	Software EULA for more information.
Developer Edition	The Developer Edition provides full, unrestricted functionality of Wowza Media Server 3 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 one (1) inbound and nine (9) outgoing streams. The Wowza Transcoder streams contain audio/video watermarks. See Wowza Media Software EULA for more information.

Entering a New or Additional License Key

License keys for all Wowza products, Server 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
```

Monthly or Daily Edition subscribers will have a single license key.

Perpetual Editions users may have more than one key to enable purchased AddOns.

To change or add a license key, edit this file using a text editor and enter each new license key on a new line. Upon next launch of the standalone server, the new license will be in effect. The licenses are additive, so when adding additional licenses, retain the original license information in the file and add each new license key on its own new line. The order that the keys are listed is not important. The first and last five digits of the license key will be displayed in the console window.

Example Server.license file for a Perpetual Edition user with a Wowza Media Server 3 license key, two Wowza Transcoder license keys and one Wowza nDVR license key.

```
SVRP3-LaGpC-ZrTD9-F4Y3S-a9bR2-h5t3C
TRN23-Ry6qe-4mT8J-yKj2W-4N5sH-2Td3a
TRN23-y9Gj2-kneqT-2zjHp-GadzB-N6fwa
DVRA3-k3r3R-nzxCB-ypjs5-Sk3y9-ahFdf
```

Configuration Files

Wowza Media Server 3 is configured through a set of XML, configuration and properties files in the [install-dir]/conf and transcoder folders. Wowza Transcoder AddOn relies on this configuration information and correct server setup. After modification to a Wowza Transcoder template, re-starting Wowza Server is not required for the change to take effect.

See the [Wowza Media Server 3 User's Guide](#) and **Configuration Reference** for more information about server configuration files and tuning. Below is a brief description of configuration files used with Wowza Transcoder.

Wowza Transcoder Template Files

Two sample template files are provided in `[install-dir]\transcoder\templates`

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 will be used as the high bitrate rendition and the lower bitrate renditions will be key frame aligned to the source video stream.

transcode.xml: Use this template when the source stream is not H.264 video (such as MPEG2) and you want Wowza Transcoder to generate a full set of bitrate renditions for adaptive streaming delivery. When using this template, the source stream is not included in the set of adaptive streaming streams available for playback.

Application Configuration File

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

- Application configuration

Features

What can I do with the Wowza Transcoder AddOn?

Wowza Transcoder AddOn provides multiple features for transcoding or transrating incoming streams, referred to as “channels” to multiple bitrates of outgoing streams which can be delivered over any transport protocol supported by Wowza Media Server.

Wowza Transcoder Video and Audio Codecs

As of the writing of this document, the following video and audio codecs are supported:

From Incoming Channels:

Video Decoding

- H.264
- MPEG2
- MPEG4 Part 2

Audio Decoding

- AAC
- MP3
- MPEG-1 Part1 1/ 2
- Speex
- G.711 (a-law and mu-law)

For Resulting Outgoing Streams:

Video Encoding

- H.264

Audio Encoding

- AAC

The non-H.264 video and non-AAC/MP3 audio codecs listed are supported for transcoding only, but are not available for direct playback.

Supported Protocols and Players

H.264 streams can be delivered over any protocol already supported by Wowza Media Server 3, including Real-Time Messaging Protocol (RTMP), Microsoft[®] Smooth Streaming, Apple HLS, Real-Time Streaming Protocol (RTSP), Flash HTTP Dynamic Streaming (HDS) protocol, Real-time Transport Protocol (RTP), MPEG2 Transport Streams (MPEG-TS) and more. Refer to [Wowza Media Server 3 User's Guide](#) for more information.

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

Supported Hardware Acceleration

Wowza Transcoder AddOn can be configured to utilize accelerated hardware such as Intel Quick Sync and Nvidia CUDA. Hardware acceleration is recommended, but not required. If your configuration does not include hardware acceleration, then the software encoder will be invoked.

As of the writing of this document Wowza Transcoder supports the following hardware on Windows 64-bit OS:

- Intel Quick Sync Video (Sandy Bridge)
<http://www.wowza.com/docredirect.php?doc=transcoderQuickSyncRequirements>
- Nvidia CUDA
<http://www.wowza.com/docredirect.php?doc=transcoderCUDARequirements>

To learn how to verify which transcoder implemented is invoked, see this online Support article <http://www.wowza.com/docredirect.php?doc=transcoderVerifyImplementation>

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 properly key frame aligned for adaptive bitrate delivery. The Wowza Transcoder templating system provides a method to group streams together in logical groups for live playback called Stream Name Groups. Stream Name Groups serve the same purpose as a Synchronized Multimedia Integration Language (SMIL) file.

A group is defined in the transcoder template

Transcode/StreamNameGroups/StreamNameGroup and members of this group are called out by their names defined in the **Encodes/Encode/Name** property. Members of the group need to be defined encode blocks within the same template.

Each of the sample transcoder templates in **[install-dir]/transcoder/templates** includes StreamNameGroup examples. Similar to the ease of defining multiple encode blocks, you can also

define multiple groups. When customizing your template, it is recommended that you define and successfully playback individual resultant streams before defining your group.

Example Stream Name Group from the transrate.xml template:

```
<StreamNameGroups>
  <StreamNameGroup>
    <Name>${SourceStreamName}_all</Name>
    <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>
```

For adaptive bitrate delivery, you can create new streams targeted at different types of users and playback. For example, you could encode one stream for Android/iPhone 3GS (supports Baseline profile level 3.0), another stream targeted at iPhone 4/iPad 1/iPad 2 (supports Main 3.1 profile or lower), and a third stream targeted at desktop or set-top box users to offer the best possible viewing experience given the user's device and bandwidth.

Playback with StreamNameGroups

At playback time, how is it determined which stream in the group will be chosen for play back? Based on the stream metadata, the player decides which stream is best suited to play, not Wowza Server. Most player technologies do the right selection, but it is not always perfect. Using the StreamNameGroup functionality allows multiple bit-rate streams to take advantage of this player feature.

The **ngrp:** prefix is used in when playing back a group using **StreamNameGroups**.

To play using an Apple iOS device (Cupertino/Apple HTTP Live Streaming):

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

To play using Adobe Flash player (San Jose/Flash HTTP):

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

To play using Microsoft Silverlight (Smooth Streaming):

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

Overlays

Wowza Transcoder AddOn provides the ability to specify a graphic overlay, such as a watermark to your video. The overlay can be in the format of a JPEG, PNG or BMP file. You can customize the location, size, alignment and opacity of your overlay. For more information about these and other Wowza Transcoder parameters, see this online tutorial on the Wowza forums, <http://www.wowza.com/docredirect.php?doc=tutorialsTranscoder>

Wowza Transcoder Logging

Log files for Wowza Media Server 3 and Wowza AddOns are located at [install-dir]/logs. Wowza Transcoder AddOn 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"}
```

Request a bitmap image with Wowza Transcoder

A built-in HTTP provider is available for use while Wowza Transcoder AddOn is actively transcoding the video portion of a stream. This HTTP provider enables requesting a bitmap image (jpeg or png) from a frame from Wowza Transcoder. For more information, see Support article online at

<http://www.wowza.com/docredirect.php?doc=usefulCodeTranscoderBitmap>

Extending the Wowza Transcoder

Wowza Media Server 3 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. The Wowza Media Server 3 and Wowza Transcoder include a rich API to interact with and control the streaming and transcoding process. For more information, see the Wowza Media Server 3 Server Side API guide and refer to the com.wowza.wms.transcoder.* packages.

Configuration

How do I setup my Wowza Media Server 3 for transcoding?

Setup of Wowza Media Server 3 for use with Wowza Transcoder AddOn is easy. All that is required is an application, configuration of that application and a template file. Wowza Transcoder is additional functionality of Wowza Media Server 3 enabled in the Application.xml.

This documentation assumes that you are familiar with the Wowza Server. Refer to the [Wowza Media Server 3 User's Guide](#) for more information about server setup and configuration. The remainder of this chapter will cover the details needed to setup transcoding.

Steps to setup Wowza Transcoder:

- Create application folder
- Create configuration folder
- Configure Application.xml file for live streaming and transcoding
- Configure template for transcoding or transrating

Create Application Folder

An application is defined simply by creating a folder in the **[install-dir]/applications** folder. You may already have an application dedicated to live streaming or you can create a new application. In this example, our application folder is **[install-dir]/applications/live**.

A single application can be configured to deliver adaptive bitrate or a single bitrate transcoded live streams to the Adobe Flash player, the Silverlight player, Apple iOS devices (iPhone, iPad or iPod touch, Roku set-top box) and an RTSP/RTP based player at the same time.

Create Configuration Folder

Create configuration folder in **[install-dir]/conf**. In this example, our configuration folder is **[install-dir]/conf/live**.

Application Configuration

Live Streaming Setup

Configure your `[install-dir]/conf/[application-name]/Application.xml` for live streaming and transcoding.

Set `Streams/StreamType` property to: **live**

To enable transcoding, set `Transcoder/LiveStreamTranscoder` property to: **transcoder**

The transcoder section of 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 Server will use the first template listed in **Transcoder/Templates** that exists.

For example, let's say your stream name was "myStream" and you created a new template named `myStream.xml` and placed it into `[install-dir]/transcoder/templates`. When a live stream named "myStream" is published, Wowza Transcoder AddOn will use the `myStream.xml` template. If no such template exists, then the default `transrate.xml` template will be used provided it remains in the installed location of `[install-dir]/transcoder/templates` directory.

You can also create a template with a custom name and include it in the `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.

Refer to the [Wowza Media Server 3 User's Guide](#) for information about other properties in the `Application.xml` file.

Limiting transcoding to specific streams

There are two ways to limit which live streams will be transcoded.

- **Transcoder/Templates** property in `Application.xml`
- Wowza Transcoder API

You can setup Wowza Media Server 3 to identify specific streams to be transcoded by using the source stream name as your template name.

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

Then create and configure the corresponding transcoder template named **[source-stream-name].xml**.

The second method is using the Wowza IDE and the Transcoder API to create a class that will only return the value of true for the targeted stream name you wish to encode.

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

For more information, see Support article online at <http://www.wowza.com/docredirect.php?doc=transcoderStreamControl>

Transcoder Template Configuration

The transcoder template allows you to customize the video and audio parameters to target multiple playback devices. The newly encoded multiple bitrate streams will be key frame aligned with each other enabling adaptive bitrate delivery from Wowza Media Server 3 for Flash RTMP or HTTP Dynamic Streaming (HDS), Microsoft Smooth Streaming, and Apple HLS. Each application or each stream can be controlled with different settings.

An encode block defines the parameters of the resultant transcoded or transrated stream. Each encode block represents a resultant encoded stream. A single template can have multiple encode blocks or you can have multiple templates based on your needs. Take into account your configuration and bandwidth when determining how many encodes your server can handle. See chapter **Performance Tuning** for more information.

Sample Templates

There are two sample templates provided in **[install-dir]/transcoder/templates, transrate.xml** and **transcode.xml**, which cover the two most common workflows. By default, Application.xml uses transrate.xml.

Template Parameters

A description of template parameters are described in this online tutorial on the Wowza forums, <http://www.wowza.com/docredirect.php?doc=tutorialsTranscoder>

Where do I start?

It is recommended to start with the sample templates using the default encoding implementation before using accelerated hardware or customizing your template.

How to I Enable New Encodes?

Use the encode blocks in the sample templates as a guide. It is 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 do not enable more encode blocks than needed.

When do I use PassThru?

If your source stream is already a H.264 video and AAC audio format and you do not wish to make any changes to the stream, then it is 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 audio or video stream will be passed through to the resultant stream. Note that you can pass through the video, the audio or both.

If the source stream is H.264 and you wish to achieve a different bitrate, profile, resolution or any other change, then set **Video/Codec** to: **H.264** and not PassThru.

In the default template, transrate.xml, shows several sample encode blocks where the **Audio/Codec** is set to: **PassThru** because the source audio is already AAC, a supported playback audio codec for Wowza Media Server. The **Video/Codec** is set to: **H.264** because properties are being set to customize the resultant stream.

Transcoding and Audio Bitrate

When transcoding, you need to set the **Video/Codec** and the **Audio/Bitrate** properties. If you forget to assign a value for **Audio/Bitrate** a default value will be assigned such that the encode of the resultant stream will not fail.

Which Profile Do I Use?

For adaptive bitrate delivery, you can create encode streams targeted for different types of playback. For example, you could encode one stream for iPhone 3GS (supports Baseline profile level 3.0) and another stream targeted at iPhone 4/iPad 1/iPad 2 (supports Main 3.1 profile or lower) to offer the best possible viewing experience given the users device and bandwidth.

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

- A mix of mobile devices (Android, iOS, etc.)
- iPhone 3GS and older
- earlier iPod touch devices
- This profile will also work for newer iOS devices such as iPhone 4, iPad 1, iPad 2, 4th generation iPod touch devices

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

- iPhone 4, iPad 1, iPad 2
- desktop
- high end delivery
- set-top boxes

Performance Tuning

How do I tune Wowza Media Server 3?

It is very important that Wowza Media Server 3 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, but it not ideal for productions use. Without proper tuning, the server under medium to heavy load will run out of resources and will stop working properly.

What settings should I use for bitrate and resolution in the template?

Determining the ideal settings for your setup 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 on the client side, your audience will need to have the bandwidth to handle that increase when downloading the stream. In addition to client bandwidth and how the resultant stream will be played back (mobile device, desktop, etc.), the type of content and purpose also needs to be taken into consideration. For example, the needs and settings for a security camera stream of a busy street where audio is not important would be different than the settings for an interview with a person who has little movement and audio quality is critical. Experimentation is usually necessary to determine a balance of settings.

Areas to check:

- First make sure your deployed Wowza Media Server 3 is tuned. See the General Performance Tuning guide, <http://www.wowza.com/docredirect.php?doc=performanceGeneralTuning>
- Check CPU usage on the Wowza Media Server 3 machine
- Bandwidth - use this tool to check bandwidth, <http://www.wowza.com/docredirect.php?doc=usefulCodeBWCheck>
- For a starting point, see examples located at [install-dir]/transcoder/templates. In each sample template, there are example encode blocks targeted at different bitrates and different playback devices. Review each parameter and customize for your workflow.

Will the number of transcoder templates impact performance?

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

What hardware do I need?

Accelerated hardware is recommended, but not required for transcoding. Recommended hardware specifications information is at.

<http://www.wowza.com/docredirect.php?doc=transcoderQuickSyncRequirements>

Where can I find performance figures?

<http://www.wowza.com/docredirect.php?doc=transcoderPerformance>

Intel Quick Sync Video (Sandy Bridge)

For more information see Support article online at

<http://www.wowza.com/docredirect.php?doc=transcoderQuickSyncRequirements>

Nvidia CUDA

For more information see Support article online at

<http://www.wowza.com/docredirect.php?doc=transcoderCUDARequirements>

Verify Which Transcoder Implementation is Invoked

For information on what to look for in the logs to determine if hardware acceleration is available,

<http://www.wowza.com/docredirect.php?doc=transcoderVerifyImplementation>