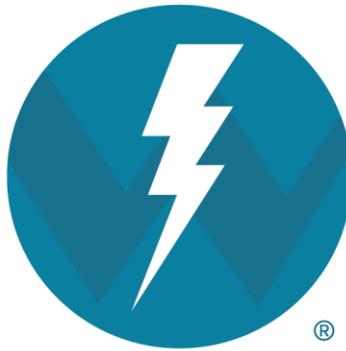Wowza Media Server® 3

Wowza nDVR AddOn

User's Guide

Version: 3.6

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Table of Contents

Chapter

1

Introduction

What is Wowza nDVR AddOn?

Wowza nDVR AddOn provides the ability to record a live stream with Wowza Media Server while simultaneously allowing users to play or pause a live stream, rewind to a previously recorded point, or resume viewing at the current live point. Custom configuration allows you to control the archive strategy and availability of your recorded streams.

Setup for client playback of recorded streams is similar to playback of live streams from 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 nDVR 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 nDVR AddOn?

Wowza nDVR AddOn is part of the Wowza Media Server installer and is supported on the same operating systems that are supported by Wowza Media Server. See the Wowza Media Server User's Guide for more installation information.

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 Editions	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 3.6 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
DVRA3-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** folder. These files are read during server startup. Wowza nDVR 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.

Application configuration file

[install-dir]\applications\Application.xml   - Application and Wowza nDVR configuration

Configuration for Wowza nDVR should be done in the **Application.xml** file. Keep **[install-dir]/conf/DVR.xml** with its default settings.

Chapter

3

Features

What can I do with the Wowza nDVR AddOn?

Wowza nDVR AddOn provides multiple features to extend your Wowza Media Server workflow. A live stream that is already configured for your Wowza Media Server workflow can be easily modified and customized to suit your archiving needs.

Video and audio codecs

Wowza nDVR AddOn supports the following video and audio codecs:

Video

- H.264
- Video-only streams

Audio

- AAC
- MP3
- Audio-only streams

Wowza nDVR is flexible and can be configured to support multiple workflows. Input can be H.264 video with either AAC or MP3 audio. In another instance, you may want to set up a different configuration and feed in and record audio-only or video-only streams.

It's a common mistake to try to record a live source stream that has an unsupported codec. However, if your source has an unsupported Wowza nDVR codec, but is a supported Wowza Transcoder ingest codec, you can transcode your source stream before recording. This setup can be accomplished with one application and doesn't require a two-step process. For more information, see the [Integrating Wowza nDVR and Wowza Transcoder](#) section of this document.

Protocols and players

H.264 streams can be delivered over any HTTP protocol already supported by Wowza Media Server, including Microsoft® Smooth Streaming, Apple® HTTP Live Streaming (HLS), and Adobe® HTTP Dynamic Streaming (HDS). For more information about supported video and audio codecs for each protocol, 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 or greater), Android™ smartphones and tablets, and IPTV/OTT set-top boxes, among others.

Recorded file location

As soon as Wowza nDVR AddOn begins recording, a storage directory is created. Inside the storage directory are time-based directories, each containing .m4fa and .m4fv files and a **manifest.txt** file. This location is defined by the **DVR/Storage/Dir** property in the **Application.xml** file.

By default, the location where Wowza nDVR writes to is:

```
[install-dir]/dvr/[app-name]/_definst_/[streamName].[n]
```

For example, if the application name is **live** and the stream name is **myStream**, with the default settings in **Application.xml**, the new directory will be located at:

```
[install-dir]/dvr/live/_definst_myStream.0
```

Directory Structure

The directory naming convention is *HHHH_MM_SS*, where *H* = hours, *M* = minutes, *S* = seconds.

By default, Wowza nDVR creates new directory every 600 seconds (10 minutes) and the archive strategy will append new audio and video to the archive when the source encoder is restarted. This value is defined in the **dvrChunkGroupingSeconds** property in the **Application.xml** file.

Each directory contains .m4fa and .m4fv files, which are the resultant chunks. If the incoming stream sends metadata, metadata .m4fm files are created.

The following is an example directory structure for a recorded stream of length 1 hour and 10 minutes:

```
0000_00_00
0000_10_00
0000_20_00
0000_30_00
0000_40_00
0000_50_00
0001_00_00
```

```
0001_10_00
manifest.txt
```

Using the folder named 0000_00_00 as an example, the initial contents would be:

```
A-0000_00_00_000.m4fa
dvrManifest_0000_00_00.txt
M-0000_00_00_000.m4fm
V-0000_00_00_000.m4fv
```

The file naming convention is the same as the directory naming with an additional millisecond value represented by mmm: *HH_MM_SS_mmm*.

.m4fa and .m4fv files

Wowza nDVR creates .m4fa and .m4fv files, which are based on the MPEG-4 multimedia container format. An .m4fa file contains audio information and an .m4fv file contains video information. Together, these files represent a chunk of recorded audio and video content that is then used for playback of your recorded stream.

You can't playback these files directly. However, they are required and referenced when you playback your live recorded stream through Wowza nDVR AddOn. You shouldn't delete or move these files; otherwise, playback errors will occur. If your configuration changes and you must move existing recorded files, make sure that the corresponding **DVR/StorageDir** property is updated in your **Application.xml** file.

Currently, concatenating these recorded files into a single video on demand file for later use isn't supported.

Manifest files

Manifest files are for information only and shouldn't be edited, moved, or deleted. Verification that Wowza nDVR related files are created is a troubleshooting step.

manifest.txt

This manifest file contains information about the recorded stream. It's at the same level as the directories. By default, this location is:

```
[install-dir]/dvr/[app-name]/_definst_/[streamName].[n]
```

dvrManifest_[HHHH]_[MM]_[SS].txt

This manifest file is part of every directory that contains .m4fa and .m4fv files and contains information about each recorded chunk. The file name corresponds to the directory's hours, minutes, seconds description.

Recording playback

Example players are provided for playback of recorded files in the **[install-dir]/examples/LiveDVRStreaming** folder. If the application name is **live** and the stream name is **myStream**:

To play using Apple HTTP Live Streaming (HLS):

```
http://[wowza-ip-address]:1935/live/myStream/playlist.m3u8?DVR
```

To play using Adobe HTTP Dynamic Streaming (HDS):

```
http://[wowza-ip-address]:1935/live/myStream/manifest.f4m?DVR
```

To play using Microsoft Smooth Streaming:

```
http://[wowza-ip-address]:1935/live/myStream/manifest?DVR
```

Adaptive bitrate delivery

Synchronized Multimedia Integration Language (SMIL)

When Wowza nDVR AddOn is added to your live workflow, you can leverage the same SMIL files you may have created for live streaming. The SMIL workflow requires you to have an encoder that can generate multiple bitrate streams from the same source that are properly key-frame aligned.

Playback with SMIL files

The **smil:** prefix is used when playing back a group using SMIL files.

To play using an Apple iOS device (Apple HLS):

```
http://[wowza-ip-address]:1935/live/smil:myStream.smil/playlist.m3u8?DVR
```

To play using Adobe Flash Player (Adobe HDS):

```
http://[wowza-ip-address]:1935/live/smil:myStream.smil/manifest.f4m?DVR
```

To play using Microsoft Silverlight (Microsoft Smooth Streaming):

```
http://[wowza-ip-address]:1935/live/smil:myStream.smil/manifest?DVR
```

For more information about how to create SMIL files, see Adaptive Bitrate Streaming.

Integrating Wowza nDVR and Wowza Transcoder

Wowza nDVR AddOn and Wowza Transcoder AddOn can be coupled together to transrate/transcode and record a live stream at the same time. This can easily be set up with

one application and one **Applicaton.xml** configuration file. Extra post-processing isn't required. For more information about Wowza Transcoder, see the Wowza Transcoder AddOn User's Guide.

A separate directory structure is created for each resultant stream from Wowza Transcoder that's recorded through Wowza nDVR. If you're using the sample Wowza Transcoder template named **transrate.xml** with a live stream named **myStream**, then you'll see the following directories created in **[install-dir]/dvr/[app-name]/_definst_/[streamName][.n]**:

myStream.0
myStream_160p.0
mySteam_360p.0

Extending Wowza nDVR

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. The server and AddOns include a rich API to interact with and control the streaming and recording process. For the most up-to-date information, tutorials, and tips, see the **Articles** tab of the Wowza Media Server Articles and Forums webpage.

Configuration

How do I setup my Wowza Media Server for Wowza nDVR AddOn?

Configuring Wowza Media Server for use with Wowza nDVR is easy. All that's required is a configured application. Wowza nDVR is additional functionality of Wowza Media Server enabled in the **Application.xml** file. This chapter describes the basic steps for setting up Wowza nDVR in the following sections:

- Create application folder
- Create configuration folder
- Configure Application.xml file for live streaming and recording
- Configure Wowza nDVR
- Configure live stream repeater (origin/edge)
- Align audio and video
- Optimize for performance

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/dvr** 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/dvr** configuration folder.

Configure Application.xml for live streaming and recording

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 recording. For additional details, see Application.xml configuration.

To enable live streaming

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

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

To enable recording

Set the **DVR/Recorders** property to **dvrrecorder**.

```
<Recorders>dvrrecorder</Recorders>
```

The **DVR** section of the **Application.xml** file looks like this by default:

```
<DVR>
    <Recorders></Recorders>
    <Store></Store>
    <WindowDuration>0</WindowDuration>
    <StorageDir>${com.wowza.wms.context.VHostConfigHome}/dvr</StorageDir>
    <ArchiveStrategy>append</ArchiveStrategy>
    <Repeater>
        <ChunkOriginURL></ChunkOriginURL>
    </Repeater>
    <Properties>
    </Properties>
</DVR>
```

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

The DVR parameters that you set in **Application.xml** apply to all Wowza nDVR streams that use this application. To apply different Wowza nDVR parameters, create a new application and customize your **Application.xml** file for that workflow.

Configure Wowza nDVR

Custom recordings

Customization of your recording, required configuration, and enabling Wowza nDVR is done in the **Application.xml** file.

The basic setup parameters are described in [How to set-up and run Wowza nDVR for live streaming](). Properties for advanced configuration are described in [How to do advanced configuration for Wowza nDVR AddOn]().

We recommend that you start with the default **append** [archive strategy]() and test with your live stream before making more advanced customizations.

Flexible recording output

By default, Wowza nDVR AddOn records the source stream as ingested, provided that it's a supported codec format. The audio and video streams are passed through to the resultant recorded stream. Wowza nDVR accommodates different workflows and gives you the flexibility to record the video-only or audio-only portion of your source stream.

Archive strategy

There are three archive strategies available: **append**, **delete**, and **version**. The strategy is controlled by the **ArchiveStrategy** property in **Application.xml**.

append

Each time a new stream with the same name is recorded, Wowza nDVR will append to the existing recording. This is the default setting.

delete

If a stream is disconnected and then restarted, the previous recording is deleted and replaced with a new recording.

version

If the stream is disconnected and then restarted, a new directory is created. If the stream name is **myStream**, the first recording is written to **[install-dir]/dvr/[application-name]/myStream.0**, the second recording is written to a directory named **myStream.1**, and so on. Whenever there's a recording of the same stream name, the previous recording is preserved and not deleted or overwritten.

Configure live stream repeater (origin/edge)

Wowza nDVR AddOn supports origin/edge configuration. Similar to the initial configuration in **Application.xml**, it's easy to add Wowza nDVR to a new or existing origin/edge configuration. For more information, see How to set up live stream repeater for use with Wowza nDVR AddOn (origin/edge).

Align audio and video

Wowza nDVR AddOn expects incoming audio and video to be in alignment. It relies on this timecode information to create chunks where the video key frames occur. If audio and video become out of alignment, Wowza nDVR tries to compensate for this problem, but it can't always resolve it.

Out-of-alignment issues start before Wowza nDVR starts recording. These kinds of alignment issues begin in the encoding process or originate as an issue with the live source. Typically you can modify the encoder settings to address the issue. It's recommended to fix audio and video alignment issues upstream from Wowza Media Server.

If out-of-alignment issues are pronounced, Wowza nDVR discards chunks and unexpected behavior can occur for time-based customized configuration. Logging messages from Wowza nDVR will alert you to out-of-alignment issues while recording. If the alignment problem can't be fixed at the source or encoder, you can use the **dvrPacketSortTime** property to add a packet sorter before the audio and video packets get to Wowza nDVR. Note that this property adds additional latency equal to its value. For more information about this and other properties, see How to do advanced configuration for Wowza nDVR AddOn.

Optimize for performance

Wowza nDVR AddOn performance is dependent on disk I/O; therefore, a fast disk is critical for best performance.