



Wowza Media Server® 3

Wowza nDVR™ 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 v3.0.1	Updated documentation links	November 28, 2011
Doc v3.0.2	Changed chunk file extensions from .ism* to *.m4f*	January 13, 2012
Doc v3.0.3	Updated to version 3.1, Release	March 29, 2012

Introduction

What is Wowza nDVR AddOn?

Wowza nDVR AddOn provides the ability to record a live stream with Wowza Media Server 3 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 control over 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 Server.

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 nDVR AddOn. The [Wowza Media Server 3 User's Guide](#) contains comprehensive documentation for Wowza Media Server 3.

Chapter
2

Installation

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

Wowza nDVR AddOn is part of the Wowza Media Server 3 installer. Wowza nDVR is supported on the same operating systems supported by Wowza Media Server 3. See [Wowza Media Server 3 User's Guide](#) for more installation information.

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.
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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 is configured through a set of XML, configuration and properties files in the [install-dir]/conf folder. These configuration files are read during server startup and Wowza nDVR AddOn relies on this configuration information and correct server setup. See the **Wowza Media Server 3 User's Guide** and **Configuration Reference** for more information about server configuration files and tuning.

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.

Features

What can I do with the Wowza nDVR AddOn?

Wowza nDVR AddOn provides multiple features to extend your Wowza Media Server 3 workflow. A live stream that is already setup for your Wowza Media Server 3 workflow is easily modified and customized to suit your archive needs.

Wowza nDVR Video and Audio Codecs

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

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 only audio or only video.

It is a common mistake to try to record a live source stream of an unsupported codec. However, if your source is 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 does not require a two-step process. For more information, see chapter **Integration with Wowza Transcoder AddOn**.

Supported Protocols and Players

H.264 streams can be delivered over any HTTP protocol already supported by Wowza Media Server 3: Microsoft[®] Smooth Streaming, Apple[®] HLS, Flash[®] HTTP Streaming (HDS) protocol.

Refer to [Wowza Media Server 3 User's Guide](#) for more information about supported video and audio codecs for each protocol.

This means newly recorded streams can be played back to many popular media players 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 tables, and IPTV/OTT set-top boxes among others.

Recorded File Location

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

By default, the location where Wowza nDVR writes to is:
[install-dir]/dvr/[app-name]/_definst_/[streamName].[n].

If the application name is **live** and 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 will create 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 re-started. This value is defined in the **dvrChunkGroupingSeconds** property.

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

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

```
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 will be:

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

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 format. An .m4fa contains audio information and an .m4fv file contains video information. These files together represent a chunk of recorded audio and video content which is then used for playback of your recorded stream.

You cannot play back these files directly. However, they are required and referenced when you play back your live recorded stream through Wowza nDVR AddOn. You should not delete or move these files or else playback errors will occur. If your configuration changes and you need to move existing recorded files, make sure that the corresponding property DVR/StorageDir is updated in your Application.xml file.

As of this writing, concatenating these recorded files into a single video on demand file for later use is not supported.

Manifest Files

This is for information only and these manifest files should not be edited, moved nor 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 is 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. It contains information about each recorded chunk. The file name corresponds to the directory's hours, minutes and seconds description.

Recording Playback

Example players are provided for playback of recorded files in the examples/LiveDvrStreaming folder. If the application name is **live** and stream name is **myStream**,

To play using an Apple iOS device (Cupertino/Apple HTTP Live Streaming):
`http://[wowza-ip-address]:1935/live/myStream/playlist.m3u8?DVR`

To play using Adobe Flash player (San Jose/Flash HTTP):
`http://[wowza-ip-address]:1935/live/myStream/manifest.f4m?DVR`

To play using Microsoft Silverlight (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 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. See the online live tutorial on the Wowza forum for instructions on SMIL file creation, <http://www.wowzamedia.com/docredirect.php?doc=tutorialsLiveRTMP>

To play using an Apple iOS device (Cupertino/Apple HTTP Live Streaming):
`http://[wowza-ip-address]:1935/live/smil:myStream_smil/playlist.m3u8?DVR`

To play using Adobe Flash player (San Jose/Flash HTTP):
`http://[wowza-ip-address]:1935/live/smil:myStream_smil/manifest.f4m?DVR`

To play using Microsoft Silverlight (Smooth Streaming):
`http://[wowza-ip-address]:1935/live/smil:myStream_smil/manifest?DVR`

Wowza nDVR and Wowza Transcoder Integration

Wowza Transcoder AddOn and Wowza nDVR 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 Application.xml configuration file. Separate post processing is not required. For more information about Wowza Transcoder, see the [Wowza Transcoder AddOn User's Guide](#).

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

```
myStream.0
myStream_160p.0
myStream_360p.0
```

Extending the Wowza nDVR

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. 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, visit the Article section of the [Wowza forums](#).

Configuration

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

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

This documentation assumes that you are familiar with the Wowza Media Server 3. 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 Wowza nDVR.

Steps to setup Wowza nDVR:

- Create application folder
- Create configuration folder
- Configure Application.xml file for live streaming and recording

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/dvr`.

A single application can be configured to deliver adaptive bitrate live streams to multiple players at the same time.

Create Configuration Folder

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

Application Configuration

Wowza nDVR Streaming Setup

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

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

To enable Wowza nDVR, set **DVR/Recorders** property to: **dvrrecorder**

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>
  <Repeater>
    <ChunkOriginURL></ChunkOriginURL>
  </Repeater>
  <Properties>
  </Properties>
</DVR>
```

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

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

Wowza nDVR Configuration

How do I enable nDVR?

Wowza nDVR AddOn is enabled by setting the **DVR/Recorders** property to: **dvrrecorder** in the Application.xml file.

Customizing Your Recording

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

The basic setup parameters are described in this online tutorial on the Support site, <http://www.wowza.com/docredirect.php?doc=tutorialsDvrSetup>

Properties for advanced configuration are described in this online tutorial on the Support web site, <http://www.wowza.com/docredirect.php?doc=ndvrAdvanceConfig>

It is recommended to start with the default archive strategy of append and test with your live stream before more advanced customization.

Recording Output Flexibility

By default, Wowza nDVR AddOn records the source stream as ingested, provided it is a supported codec format. The audio and video stream will be passed through to the resultant recorded stream. Wowza nDVR accommodates different workflows and gives you the flexibility to record only the video or only the audio of your source stream.

Archive Strategy

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

append: The default setting is append. This means that each time a new stream with the same name is recorded, Wowza nDVR will append to the existing recording.

delete: If a stream is disconnected and then re-started, it will delete the previous recording and be replaced with the new recording.

version: If the stream is disconnected and then re-started, a new directory will be created. If the stream name is 'myStream', the first recording will be [install-dir]/dvr/[application-name]/myStream.0 and the second recording will be written into a directory named myStream.1, etc. Each time there is a recording of the same stream name; the previous recording is preserved and not deleted nor overwritten.

Origin-Edge Configuration

Wowza nDVR AddOn supports origin-edge configuration. Similar to the initial configuration in Application.xml, it is easy to add Wowza nDVR to a new or existing origin-edge configuration.

Origin-edge setup instructions are described in this online tutorial on the Wowza forum, <http://www.wowza.com/docredirect.php?doc=ndvrLiveRepeater>

Audio and Video Alignment

Wowza nDVR AddOn expects incoming audio and video to be in alignment. It relies on this timecode information to create chunks where the video keyframes occur. If audio and video become out of alignment, Wowza nDVR will try to compensate for this problem, but it cannot always resolve it.

Out of alignment issues begin prior to the recording process performed by Wowza nDVR. These kinds of alignment issues begin in the encoding process or an issue with the live source. Typically a modification of the encoder settings addresses the issue. It is recommended to fix audio and video alignment issues upstream from Wowza Server.

If out of alignment issues are pronounced, Wowza nDVR will discard chunks and behavior may not be as expected for time-based customized configuration. Logging messages from Wowza nDVR will alert you to out of alignment issues while recording. The **dvrPacketSortTime** property can be used to add a packet sorter before the audio and video packets get to Wowza nDVR if the alignment problem cannot be fixed at the source or encoder. Note that this property will add additional latency equal to its value. For more information about this and other properties, see the [Wowza nDVR Advanced Configuration](#) online article on the [Wowza forums](#).

Performance

Wowza nDVR AddOn performance is dependent on disk I/O. Therefore, a fast disk is critical.