



Wowza nDVR

User Guide

Wowza nDVR User Guide



Version: 4

www.wowza.com

This document is for informational 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.

No Endorsement or Warranty for Third-Party Links and Software

This document contains links to third-party websites ("Linked Sites") that are not under the control of Wowza Media Systems™, LLC ("Wowza™"). Wowza is not responsible for the content on or operation of Linked Sites. If you access Linked Sites, you do so at your own risk and understand that Wowza accepts no responsibility or liability for the content or operation of Linked Sites. Wowza provides these links only as a convenience, and the inclusion of a link does not imply that Wowza endorses such Linked Sites or any content, products, or services available from Linked Sites.

This document also refers to third-party software that is not licensed, sold, or distributed by Wowza (collectively, "Third-Party Software"). Wowza does not endorse, is not responsible for, and accepts no liability related to Third-Party Software. Please ensure that any and all use of Wowza software and third-party software is properly licensed.

Wowza Trademarks

Wowza™, Wowza Streaming Cloud™, Wowza Streaming Engine™, along with other trademarks, logos, trade dress, and other proprietary colors and markings, are each trademarks or registered trademarks of Wowza in the United States and in other countries (collectively, "Wowza Marks"). No right to use Wowza Marks in any way is granted hereunder. Contact sales@wowza.com for information about obtaining the right to use Wowza Marks. Any use of Wowza Marks, authorized or otherwise, shall inure to the sole benefit of Wowza.

Third-Party Trademarks and Copyrights

Trademarks, product names, logos, designs, trade dress, and other proprietary markings of non-Wowza third parties (collectively, "Third-Party Marks") may be trademarks or registered trademarks of their respective owners. Use of Third-Party Marks is for the sole purpose of identifying third-party products and services and does not represent endorsement, sponsorship, partnership, or other affiliation between Wowza and such third parties.

A list of applicable patent and copyright notices related to content in this document is available on the Wowza website at www.wowza.com/legal.

Document History

Version	Description	Date
Doc v4.0	Document release for Wowza Streaming Engine 4.0 software	02-11-2014
Doc v4.1	Document update for Wowza Streaming Engine 4.1 software	09-16-2014
	Updated licensing information for Wowza Streaming Engine 4.1.1 software.	02-18-2015
	Document update for Wowza Streaming Engine 4.1.2 software	03-03-2015
Doc v4.2	Document update for Wowza Streaming Engine 4.2 software	06-10-2015
Doc v4.3	Document update for Wowza Streaming Engine 4.3 software	10-06-2015
	Updated licensing information for Wowza Streaming Engine software.	12-22-2015
Doc v4.7	Document update for Wowza Streaming Engine 4.7.6 software	07-02-2018

Table of Contents

Introduction	6
Installation	7
Licensing requirements for Wowza nDVR	7
Features	9
Video and audio codecs.....	9
Protocols and players	10
Recorded file location	10
.m4fa and .m4fv files.....	12
Manifest files.....	13
Recording playback	13
Adaptive bitrate delivery.....	14
Integrating Wowza Transcoder and Wowza nDVR.....	14
Extending Wowza nDVR.....	15
Configuration in Wowza Streaming Engine Manager.....	16
Configuration notes.....	22



Introduction

What is Wowza nDVR?

Wowza™ nDVR provides the ability to record a live stream with Wowza Streaming Engine™ software 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 playing recorded streams is similar to playing live streams from Wowza Streaming Engine.

For more information that may be useful for setting up nDVR, see:

- [Get started with Wowza nDVR](#)
- [Plan your Wowza nDVR workflow](#)
- [Set up and run Wowza nDVR in Wowza Streaming Engine](#)
- [Configure advanced properties for Wowza nDVR](#)

Installation

What do I need to install and run Wowza nDVR?

Wowza nDVR is part of the Wowza Streaming Engine and is supported on the same operating systems that are supported by Wowza Streaming Engine.

Licensing requirements for Wowza nDVR

Perpetual and Subscription licenses for Wowza Streaming Engine provide for unlimited connections to the media server instance and enable use of the Wowza nDVR technology that's integrated with each licensed instance.

A Perpetual license is best for stable, long-term demand. A Perpetual license key will have either an **EPBP4** or **EPBU4** prefix (depending on date of purchase) and is for use with one Streaming Engine instance and the integrated nDVR technology. A Subscription license is best for variable demand. You can install as many instances of Wowza Streaming Engine as needed using the same license key and enable the nDVR technology integrated with each instance. A Subscription license key has an **ENGM4** prefix. For more information on plans, see [Wowza Streaming Engine Pricing](#).

The license key you enter when you install Wowza Streaming Engine is displayed in the **License Keys** box in Wowza Streaming Engine Manager. If you switch your licensing option for the Wowza Streaming Engine instance, you can replace the existing license key with the new license key without reinstalling the software. If you purchased a license key to enable nDVR for use with the licensed server instance, you can add this license key.

All license key values are stored in the `[install-dir]/conf/Server.license` file in the Wowza Streaming Engine installation.

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

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

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

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

Notes

- After you restart the server, Wowza Streaming Engine Manager displays the first and last five digits of the license keys that you entered in the **License Keys** box to help protect this information.
- If you purchased a license for Wowza Streaming Engine before January 1, 2015, contact sales@wowza.com to learn more about how to license Wowza nDVR.

Features

What can I do with Wowza nDVR?

Wowza nDVR provides multiple features to extend your streaming workflow. A live stream that's already configured for your streaming workflow can be modified easily and customized to suit your archiving needs.

Video and audio codecs

Wowza nDVR supports the following video and audio codecs:

Video

- H.264
- Video-only streams

Audio

- AAC
- MP3
- Audio-only streams

By default, Wowza nDVR 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 the audio-only portion of your source stream.

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 [Integrating Wowza Transcoder and Wowza nDVR](#) in this document.

Protocols and players

Wowza nDVR supports HTTP playback of recorded streams using the following streaming protocols:

- Adobe HTTP Dynamic Streaming (Adobe HDS/San Jose)
- Apple HTTP Live Streaming (Apple HLS/Cupertino)
- Microsoft Smooth Streaming (Smooth)
- MPEG-DASH

This means newly encoded streams can be played 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, IPTV/OTT set-top boxes, and other players and devices.

Recorded file location

You can set the location of recorded file and other options for Wowza nDVR in Wowza Streaming Engine Manager, as shown in the following figure. For more information, see [Configuration in Wowza Streaming Engine Manager](#) in this document.

dvr > nDVR

Live Single Server or Origin

nDVR is enabled. Depending on your subscription license terms, your account might incur additional charges while the application is active. To stop charges for this application instance, disable nDVR. To stop all nDVR-related charges, disable nDVR in all applications.

Configure DVR playback of live streams.

Status:  Enabled



DVR Store Directory

`$(com.wowza.wms.context.VHostConfigHome)/dvr`

Streaming Options

Live and DVR streaming

Recording Options

 Start recording on startup

Archive Method

append

DVR Window Duration

All material available

As soon as nDVR starts recording, a storage directory is created. Inside the storage directory are time-based directories, each containing **.m4fa** audio and **.m4fv** video files, which are the resultant chunks, and a **manifest.txt** file. If the incoming stream has metadata, **.m4fm** metadata files are created. By default, the location where 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, 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, and *S* = seconds.

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

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** audio and **.m4fv** video files, which are based on the MPEG-4 multimedia container format. Together, these files represent a chunk of recorded audio and video content that's used for playback of your recorded stream.

You can't play these files directly. However, they are required and referenced when you play your live recorded stream using nDVR. If you delete or move these files, playback errors will occur. If your configuration changes and you must move recorded files, make sure that the corresponding **DVR/StorageDir** property is updated in your configuration.

Currently, concatenating these recorded files into a single 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.

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_[HHH][MM][SS].txt

This manifest file is part of every directory that has **.m4fa** and **.m4fv** files and contains information about each recorded audio and video 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 Wowza Streaming Engine Manager and the **[install-dir]/examples/LiveDVRStreaming** folder in the Wowza Streaming Engine installation. If the application name is **live** and the stream name is **myStream**:

To play using Adobe HDS:

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

To play using Apple HLS:

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

To play using Microsoft Smooth Streaming:

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

To play using MPEG-DASH:

```
http://[wowza-ip-address]:1935/live/myStream/manifest_mp[manifest-profile]_mv[manifest-variation].mpd
```

Adaptive bitrate delivery

Synchronized Multimedia Integration Language (SMIL)

When Wowza nDVR 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 keyframe-aligned, multiple bitrate streams from the same source.

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

To play using Adobe HDS:

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

To play using Apple HLS:

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

To play using Microsoft Smooth Streaming:

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

To play using MPEG-DASH:

```
http://[wowza-ip-address]:1935/live/smil:myStream.smil/manifest_mp[manifest-profile]_mv[manifest-variation].mpd
```

For more information about how to create SMIL files, see [Stream adaptive-bitrate content with Wowza Streaming Engine](#).

Integrating Wowza Transcoder and Wowza nDVR

Wowza Transcoder and Wowza nDVR can work together to transrate/transcode and record a live stream at the same time. This can be set up with one application and one configuration. Extra post-processing isn't required. For more information about Wowza Transcoder, see [Use Wowza Transcoder](#).

Wowza nDVR records each output rendition from Wowza Transcoder in a separate directory structure. 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
myStream_360p.0

Extending Wowza nDVR

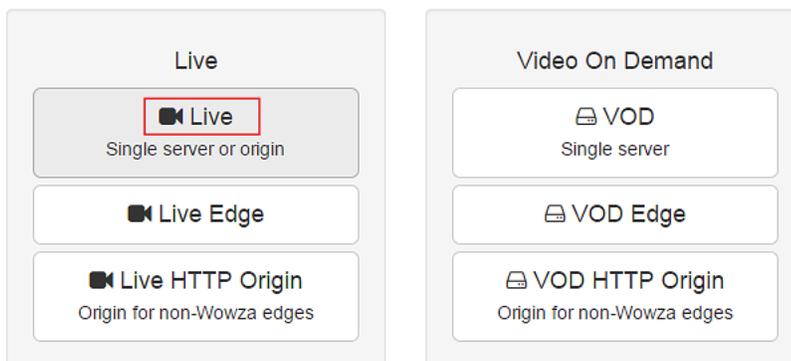
Java technology is used to build the Wowza Streaming Engine. Because of this, the Wowza Streaming Engine can be extended by writing custom Java classes that are dynamically loaded at runtime. The server includes a rich API to interact with and control the streaming and recording process. For information, see the [Wowza Streaming Engine Java API](#) docs.

Configuration in Wowza Streaming Engine Manager

How do I set up my Wowza Streaming Engine instance for Wowza nDVR?

Configuring Wowza nDVR in Wowza Streaming Engine is easy. This section provides the basic steps for using Wowza Streaming Engine Manager to set up an application for live streaming and with DVR capability.

1. In Wowza Streaming Engine Manager, click the **Applications** tab and then click **Add Application** in the contents panel.
2. On the **Add Application** page, click the **Live** button to select that application type.
Add Application
Select an Application Type.



- In the **New Application** dialog box, enter a name, such as **dvr**, and then click **Add**.

- Expand the **dvr** application in the contents panel, click **nDVR**, and then click **Enable nDVR**.

Note

Wowza Streaming Engine must be properly licensed to enable nDVR. For details, see [Licensing requirements for Wowza nDVR](#).

5. Click **Restart Now** to apply the changes.

nDVR has been enabled for this application. You must restart the application for changes to take effect. [Restart Now](#)

6. The **Status** field will show that Wowza nDVR is enabled.

Application has been restarted

dvr > nDVR

Live Single Server or Origin

nDVR is enabled. Depending on your subscription license terms, your account might incur additional charges while the application is active. To stop charges for this application instance, disable nDVR. To stop all nDVR-related charges, disable nDVR in all applications.

Configure DVR playback of live streams.

Status: Enabled

[Edit](#)

[Disable nDVR](#)

DVR Store Directory

`${com.wowza.wms.context.VHostConfigHome}/dvr`

Streaming Options

Live and DVR streaming

Recording Options

Start recording on startup

Archive Method

append

DVR Window Duration

All material available

7. Click **Edit** to configure nDVR settings.

dvr > nDVR

Live Single Server or Origin

nDVR is enabled. Depending on your subscription license terms, your account might incur additional charges while the application is active. To stop charges for this application instance, disable nDVR. To stop all nDVR-related charges, disable nDVR in all applications.

* = Required field

DVR Store Directory

Streaming Options

- Live and DVR streaming
- DVR streaming only

Recording Options

- Start recording on startup

Archive Method

DVR Window Duration

- All material available
- Use window duration:

: :
 Hours Minutes Seconds

DVR Store Directory

Specifies the top-level folder where DVR streams are stored. This can contain an explicit path (for example, **C:/myDvr**) or an environment variable (for example, **{com.wowza.wms.context.VHostConfigHome}**). The following environment variables are supported.

{com.wowza.wms.AppHome}	Application home directory
{com.wowza.wms.ConfigHome}	Configuration home directory
{com.wowza.wms.context.VHost}	Virtual host name
{com.wowza.wms.context.VHostConfigHome}	Virtual host config directory
{com.wowza.wms.context.Application}	Application name
{com.wowza.wms.context.ApplicationInstance}	Application instance name

Streaming Options

Specifies how an incoming live stream can be played by indicating if the *?DVR* query parameter must be appended to playback URLs.

To specify that a live stream can be played with or without DVR playback controls, select **Live and DVR streaming**. This option means that the live stream is available for playback with or without the *?DVR* query parameter appended to playback URLs. If *?DVR* isn't appended to the playback URL, the live stream can still be played but DVR playback isn't supported.

To specify that a live stream can be played only by using the DVR playback controls in a player, select **DVR streaming only**. This option means that the *?DVR* query parameter must be appended to playback URLs.

Recording Options

Select **Start recording on startup** to automatically begin recording a live stream that's published to the application for DVR when the application starts.

Archive Method

These options specify how nDVR handles recording a new stream that's published to the application with the same stream name. This often happens if the current live stream is disrupted when encoders restart.

The **Append** option is the best option to use to handle disruptions in the live stream. Each time a new stream with the same name is recorded, nDVR appends to the existing recording. This is the default setting.

The **Delete** option deletes the previous recording and starts a new recording.

The **Version** option starts a new recording in a new folder in the DVR store for each new stream. 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 isn't deleted or overwritten.

DVR Window Duration

These settings specify the amount of recorded material in the DVR store that's available for DVR playback.

To make the entire recording available for playback, select **All material available**. This option enables viewers who join the live stream in-progress to rewind and watch the stream from the beginning. This option also preserves the live stream recording after the stream ends.

To make only part of the live stream available for playback, select **Use window duration** and then specify the duration in **Hours:Minutes:Seconds**. The minimum supported duration value is 60 seconds. This option enables viewers who join the live stream in progress to rewind the stream for the duration that you specify and watch from that point forward. The duration window is a "floating window" that always ends at the current live point. Recorded data that falls outside this window is purged from the DVR store.

Note

You can record up to 30 hours of material for DVR playback; however, you may encounter performance and playback issues if you make longer durations of material available for playback. For best practices, see [Recording length](#).

- Click **Save**, and then click **Restart Now** to apply the changes.

 Saved! You must restart the application for changes to take effect. 

- Publish a live stream to the **dvr** application. For details, see [Connect a live source to Wowza Streaming Engine](#). If you selected **Start recording on startup** as described above, the **dvr** application will automatically record the stream when the encoder begins sending it, and users can seek to earlier segments of the live stream.

Notes

- If you want to manually control when the recording starts, you must use the Wowza Streaming Engine Java API. See [Use Wowza nDVR recording API](#).
- Additional configuration properties are described in [Configure advanced properties for Wowza nDVR](#). We recommend that you start with the default **append** archive strategy and test with your live stream before making advanced customizations.

Configuration notes

Align audio and video

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

Alignment issues start before nDVR starts recording. They 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. You should fix audio and video alignment issues upstream from Wowza Streaming Engine.

If alignment issues are pronounced, nDVR discards chunks and unexpected behavior can occur in time-based custom configurations. nDVR will log messages to alert you to 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 nDVR. Note that this property adds additional latency equal to its value. For more information about this and other properties, see [Configure advanced properties for Wowza nDVR](#).

Configure live stream repeater (origin/edge)

Wowza nDVR supports origin/edge configuration. For information, see [Set up a Wowza Streaming Engine live stream repeater for Wowza nDVR](#).

Optimize for performance

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

Customize recordings

Instructions for customizing your recording and enabling Wowza nDVR are described in [Set up and run Wowza nDVR in Wowza Streaming Engine](#).