

# Watching H.264 (and other) videos using Compute Unified Device Architecture (CUDA) or DXVA2 (DirectX Video Acceleration) native/renderless or Intel QuickSync Decoder or high performance software decoding

Shortlink of this post – <http://wp.me/PrgSo-b1> (use this link in your forum/BBS/IRC/twitter/facebook etc. messages)

**Alternative reading: same configuration with this page using PotPlayer – [click here](#).**

## TABLE OF CONTENTS

[CHANGELOG](#)

[INTRODUCTION](#)

[CHECKLIST](#)

[TUTORIAL](#)

[MISCELLANEOUS](#)

## CHANGELOG

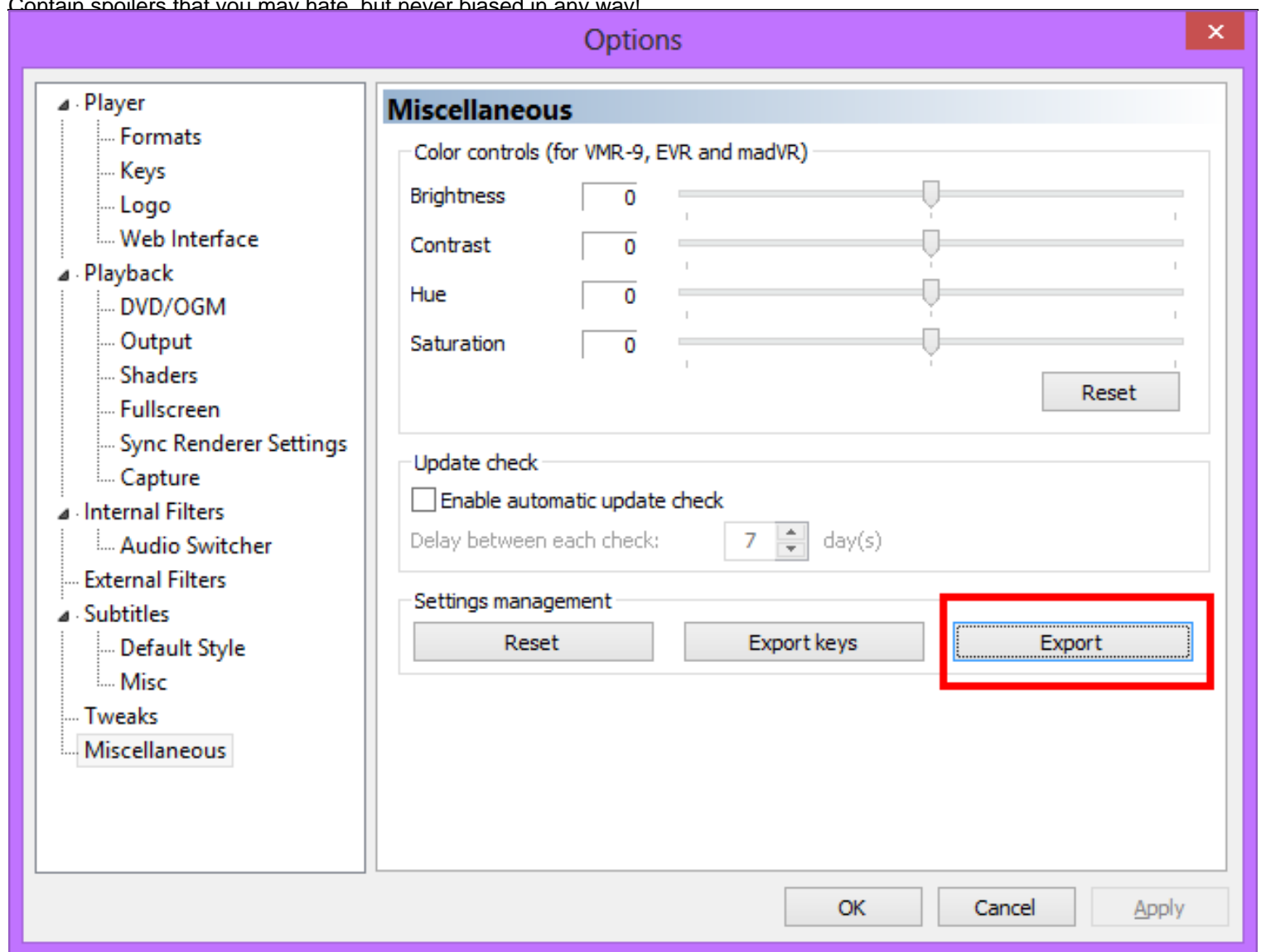
21 September 2014 – Modified slightly the CUVID decoding method below to include the HEVC hybrid decoding method.

Also included: [A detailed QuickSync headless mode setup](#). You do not need this if you use Windows 8 and has installed the latest drivers.

From 12 May 2014, the installer will always reset the MPC-HC settings. Existing users that wants to retain their custom settings should make a back-up of their settings by going to the 'Miscellaneous' section and clicking the 'Export' button, as shown below.

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Troubleshooting:-

## INTRODUCTION

When this guide was first written nearly three years ago, it exclusively focused on making GPU-accelerated video playback. Today's update means that you can use MPC-HC to use a variety of GPU acceleration options, depending on the computer configuration that you have, and of course, your preferences. Not only that, you can use software decoding too if you wanted it.

Suggested hardware – with consideration of software decoding and usage of madVR.

Updated January 2018 - With the advent of 4K UHD HDR displays, UHD discs now rippable, madVR removing NNEDI3 from image upscaling section and SPECTRE + MELTDOWN fiasco, there is only one hardware combination that you should get, which is AMD Ryzen systems with nVidia GPUs.

Recommended baseline CPU: [AMD Ryzen 5 1600X Processor \(YD160XBCAEWOF\)](#).

Recommended Motherboard: [ASRock X370 TAICHI Socket AM4/AMD X370/DDR4/Quad CrossFireX &](#)

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[SLI/SATA3&USB3.1/M.2/Wi-Fi/A&GbE/ATX Motherboard.](#)

It is really hard for you to go wrong with these two, especially when playing 4K HEVC 10-bit videos in software mode using LAV Video Decoder 64-bit. No Intel until maybe three to five years from now.

As for GPUs, it depends whether you have a 4K display or not. Now assuming that you want a 4K display right now that is capable of HDR for watching videos, I suggest that you do not bother with 4K HDR computer monitors, and go straight to a big 4K UHD TV.

Example 4K UHD TV: [LG Electronics OLED55E7P 55-Inch 4K Ultra HD Smart OLED TV \(2017 Model\).](#)

The TV above is 55", 4K resolution and has HDR too. The size means you do not have to change Windows scaling to have a usable desktop.

GPU recommendation (high-end - 4K HDR display or not): [ZOTAC GeForce GTX 1080 Ti AMP Edition 11GB GDDR5X 352-bit PCIe 3.0 Gaming Graphics Card VR Ready\(ZT-P10810D-10P\).](#)

Regardless whether you have a 4K display or not, the best nVidia GPU recommended is a GTX 1080Ti like the one above. It supports HEVC 10-bit and VP9 hardware video decoding, and does HDR passthrough really well. Can really handle NGU in madVR to as long as you don't go overboard.

GPU recommendation (low-end - 4K HDR display): [ZOTAC GeForce GTX 1050 Ti OC Edition 4GB GDDR5 Super Compact Gaming Graphics Card \(ZT-P10510B-10L\).](#)

GPU recommendation (low-end - non-4K display or 4K non-HDR display ): [ZOTAC GeForce GTX 1060 Mini, ZT-P10600A-10L, 6GB GDDR5 Super Compact VR Ready Gaming Graphics Card.](#)

The GPU for displays not capable of HDR (GTX 1060) is more powerful than GPU for 4K HDR displays (GTX 1050Ti) because converting HDR to SDR via pixel shader operations is a quite costly operation in term of GPU resources. These two can handle all relevant video codecs, but if you have a 4K display, you should choose the bottom-most madVR preset in the installer.

Lastly, try and get Windows 8.1 instead of Windows 10 or Windows 7.

## CHECKLIST

Main Programs:-

1. [DirectX End-user Runtime June 2010](#) –**This is a mandatory installation.** You can install this via the LAV Filter Megamix installer below (requires a working Internet connection). If you already

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- have this runtime installed (some games install this for you), there is no need to redownload this.
2. Windows 7 SP1 Platform Update – Download [here](#). For Windows 7 users, this package needs to be installed to use DirectX 11 features in madVR. Also can be installed via Windows Update (KB2670838).
3. LAV Filters Megamix – Download the [64-bit](#) version or [32-bit](#) version. Compile time: 22 February 2019 10:05pm UTC+8. Build: 117bab8fc95. Changes: New LAV Filters build. Note: Do not use the new D3D11 native decoding mode in LAV Video Decoder if you plan to play interlaced videos and/or plan to use the madVR super-low-end (DXVA scalers) preset.
  - Contains MPC-HC (and PotPlayer + MPDN), LAV Filters, madVR, Reclock (only in 32-bit installer), AssFilterMod, XySubFilter (disabled by default) and xy-vsfilter (disabled by default). [doom9 thread for LAV Filters](#). [doom9 thread for madVR](#), [doom9 thread for XySubFilter + xy-vsfilter](#), [doom9 thread for AssFilterMod](#). 64-bit version is vastly recommended. [Use the 32-bit version only if you need Reclock or have 32-bit Windows](#).
1. DXVA Checker – Download from [here](#). Provides information about your GPU video decoding capabilities.
2. GPU-Z – Download from [here](#). Provides general information about your GPU.
3. CPU-Z – Download from [here](#). Provides general information about your CPU.
4. Driver Sweeper – Download from [here](#). Clean up remnants of device drivers installations for clean reinstall.

### Test files:-

1. H.264 SD video clip with styled karaoke subtitles [[MediaInfo](#)] – [The Melancholy of Haruhi Suzumiya](#) NCED theme (Hare Hare Yukai) – download [here](#).
2. H.264 720p video clip with styled karaoke subtitles [[MediaInfo](#)] – [Clannad](#) NCED theme (Dango Daikazoku) – download [here](#).
3. H.264 1080p video clip with styled karaoke subtitles [[MediaInfo](#)] – [AIR](#) NCOP theme (Tori no Uta) – download [here](#).
4. H.264 1080p video clip with styled karaoke subtitles [[MediaInfo](#)] – [Clannad After Story](#) NCOP theme (Toki wo Kizamu Uta) – download [here](#).
5. H.264 1080p video clip with styled subtitles [[MediaInfo](#)] – [Planet Earth: From Pole to Pole](#) – download [here](#).
6. Optional test file for testing deinterlacing capabilities: H.264 1080i video clip [[MediaInfo](#)] – [History Channel – Decoding the Past: Mysteries of the Freemasons](#) – download [here](#).
7. Optional test file for testing splitter's segment linking capabilities: 3x H.264 anamorphic 1080p video clips with styled subtitles [[MediaInfo](#)] – [K-On!!](#) episode 6 – download [here](#).
8. Optional test file to test H264 4K playback and scaling performance: 8-bit H.264 video clip with 125Mb bitrate [[MediaInfo](#)] [4k UDHTV LG Demo video](#) – download [here](#).
9. **Optional (animation) test file to test Hi10p decoding performance:** H.264 1080p 10-bit video clip (no subtitles) [[MediaInfo](#)] [Sentai Filmworks' Angel Beats trailer](#) – download [here](#).  
2-pass encode with 10000Kbps bit-rate, 16 reference frames and 8 b-frames. Visually lossless compared to the source Blu-ray, even with 50% size reduction. If you can play this file flawlessly, your system should be good enough to play 99.999% Hi10p videos that anime fansubs groups will encode in the future. Even Tenshi's encodes.
10. **Optional (real-life) test file to demonstrate Hi10p encoding efficiency:** H.264 1080p 10-bit video clip (PGS subtitles) [[MediaInfo](#)] – [Pirates of the Caribbean: At World's End](#) blooper reel – download [here](#).  
2-pass encode with saner settings: 3072Kbps bit-rate, 3 reference frames, 3 b-frames. Differences in visual quality between the encoded file and the source Blu-ray is pretty much negligible. This clip is more than 3 times longer than the [Highschool of the Dead](#) clip above, yet the differences in size is merely only 20MB. A massive 80% file reduction has been achieved from the source file, with no

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80% quality reduction, or any need to downscale to lower resolutions either.

- Optional test file to test HEVC 4K playback and scaling performance: 10-bit H.265 video clip (no subtitles) [MediaInfo] Samsung SUHD demo video – Colorful Food – download [here](#).

If you have any problems downloading the files, please make a comment below.

## TUTORIAL

Jump to:-

[Step 1 – Installation Stage](#)

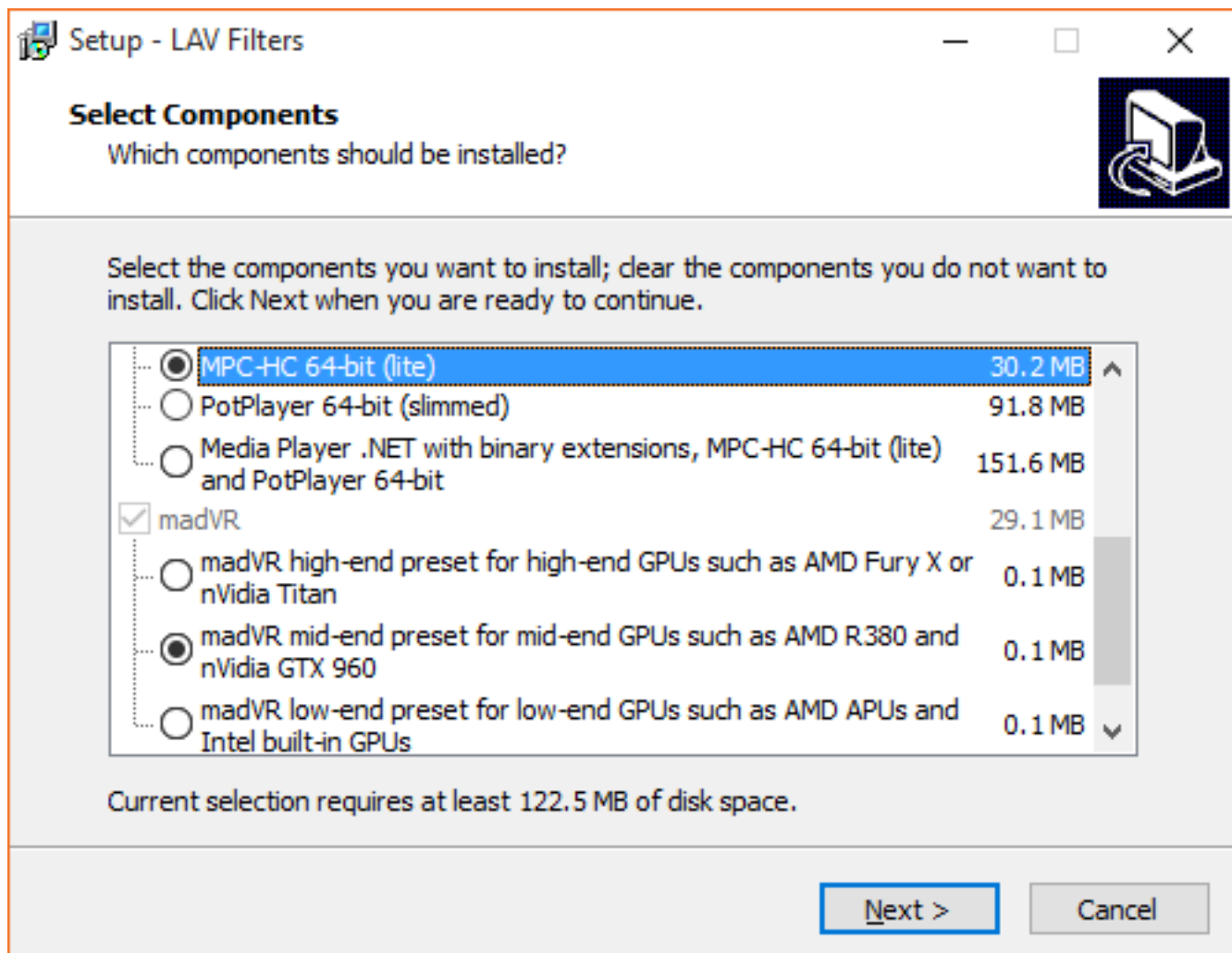
[Step 2 – Choosing Your Preferred Decoding Method By Configuring LAV Video Decoder](#)

[Step 3 – Configuring LAV Splitter Source and LAV Audio Decoder](#)

[Step 4 – Configuring madVR](#)

### Step 1 – Installation Stage

Download the LAV Filters Megamix above and install it. Make sure you do not forget to select MPC-HC in the screen below.



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Then select a madVR profile that fits your preferences and GPU profile. If you enabled the 'H.264 MVC 3D Decoder (extra download)' option, you will need a working Internet connection to complete the installation process.

You will still need to go to [madVR settings page](#) and configure your display's characteristics ('devices → 'your-display-name-here').

**MPC-HC can now be started via 'All Programs → LAV Filters → Media Player Classic HomeCinema'. Using Windows 8? It should be available somewhere in the Start Screen.**

## Step 2 – Choosing Your Preferred Decoding Method By Configuring LAV Video Decoder

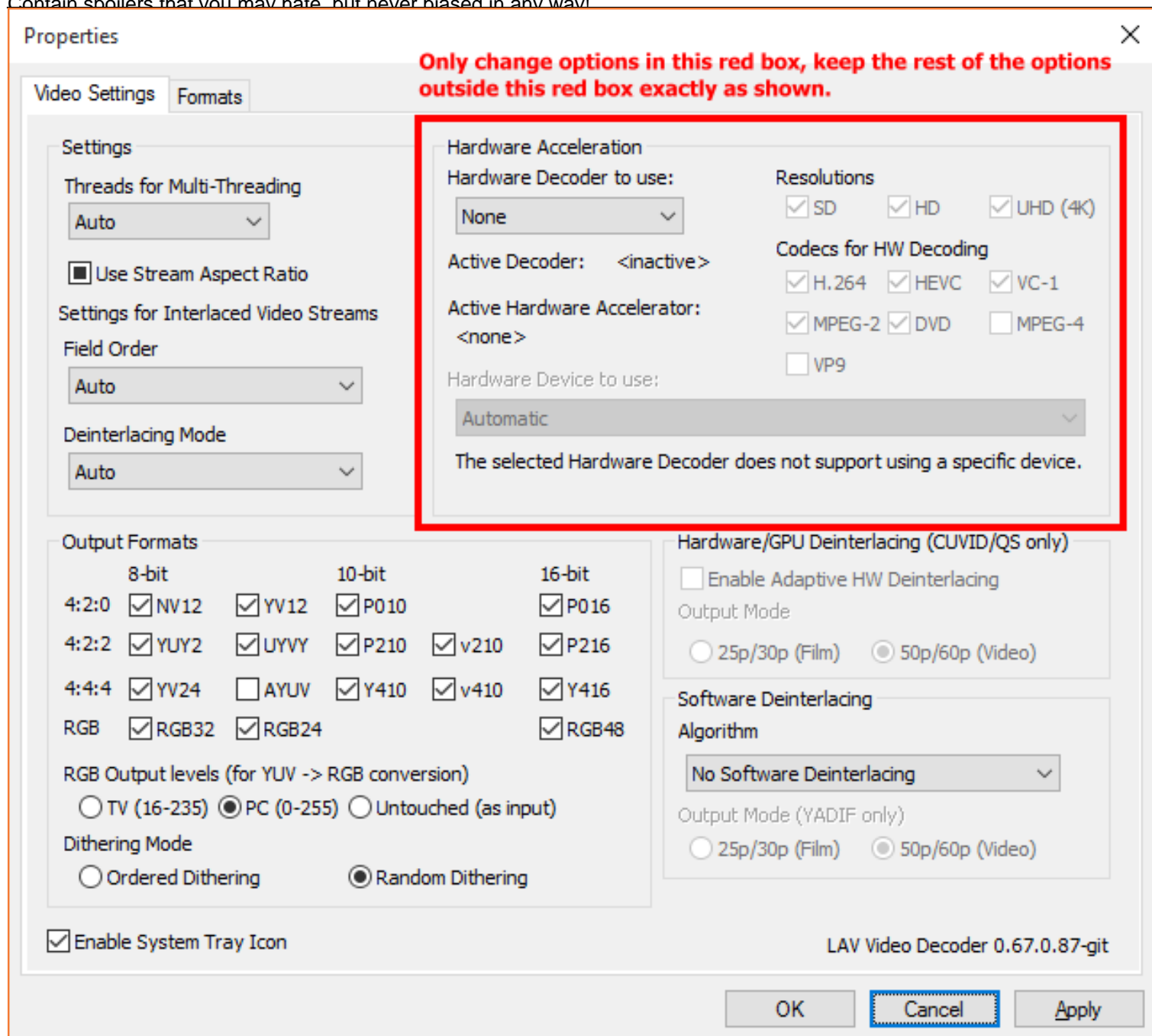
It will be here where you will have to decide which decoding method from the list below that you want to use:-

1. High performance software decoding mode.
2. DXVA renderless decoding mode.
3. CUDA decoding mode.
4. Intel QuickSync decoding mode.
5. Native DXVA decoding mode.

Go to 'Start Menu → All Programs → LAV Filters → LAV Video Configuration' to bring up LAV Video Decoder property page. For Windows 8 users, the shortcut should be somewhere in the Metro Start page. LAV Video Decoder property page will appear and ready to be configured according to your preferred decoding method.

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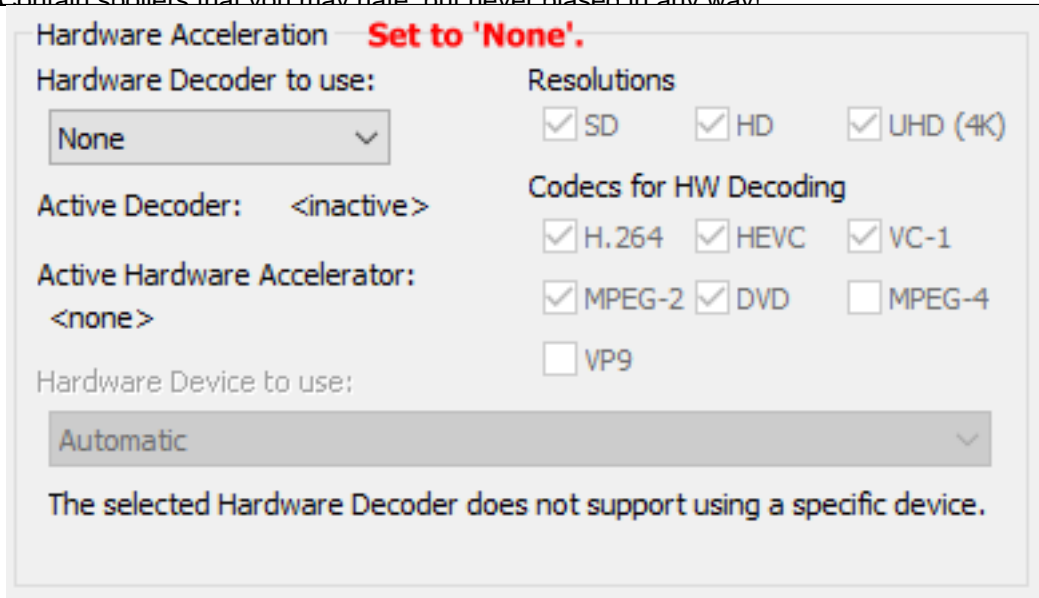
### Method #1 – High performance software decoding mode.

Mainly used for Hi10p videos, and other video codecs if your GPU doesn't support it. For best results, you need a fast dual-core CPU with minimum speed of 3Ghz. A quad-core CPU should at least have 2.5Ghz of speed at least.



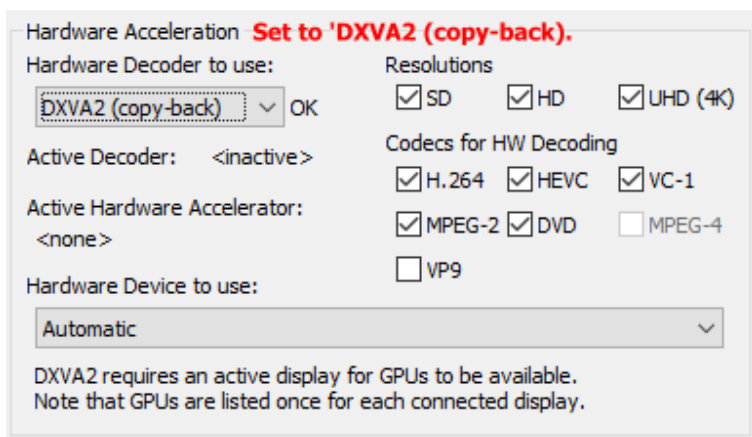
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### Method #2 – DXVA renderless decoding mode.

**Works only in Windows Vista and later.** Works best with nVidia GPUs, and also ATI GPU series that has UVD3 or later. ATI UVD2.x users may have to switch to EVR custom presenter. Doesn't work on Hi10p videos and other unsupported video formats, and will fall into high performance software decoding mode when such files are played.



HEVC can only be supported if your GPU expose the 'HEVC\_VLD\_Main' and 'HEVC\_VLD\_Main10' mode in DXVA Checker. This is also the mode you have to use if you want to decode 10-bit HEVC videos with nVidia GTX960 GPUs. VP9 is supported is your GPU expose the 'VP9\_VLD\_Profile0' mode



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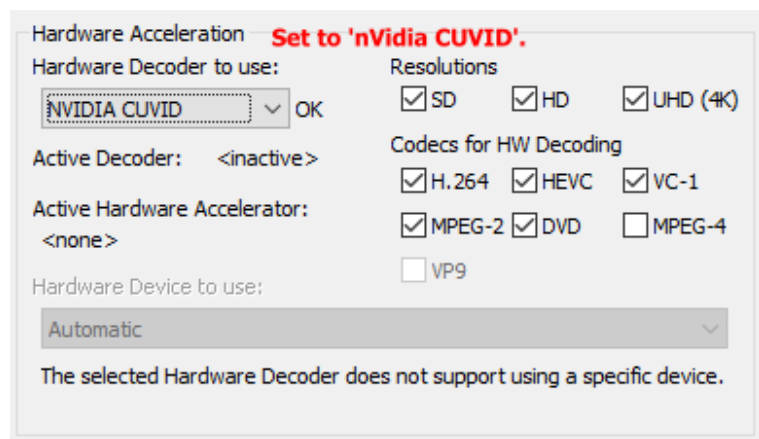
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in DXVA Checker.

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### Method #3 – CUDA decoding mode (nVidia GPUs only).

note: Must use driver version 340.52, if your GPU is supported, if you want HEVC hybrid decoding support.

Doesn't work on Hi10p videos and other unsupported video formats, and will fall into high performance software decoding mode when such files are played. **Windows 10 users should avoid this method, and instead should use the DXVA renderless method above.**



Configure the 'Codecs for HW decoding' appropriately according to the nVidia GPU you have:-

- nVidia PureVideo 2 – H.264 and DVD.
- nVidia PureVideo 3 – H.264, VC-1, MPEG-2 and DVD.
- nVidia PureVideo 4 – H.264, VC-1, MPEG-2, DVD and MPEG-4.
- nVidia PureVideo 5 and later – H.264, VC-1, MPEG-2, DVD, MPEG-4, VP9 and HEVC.

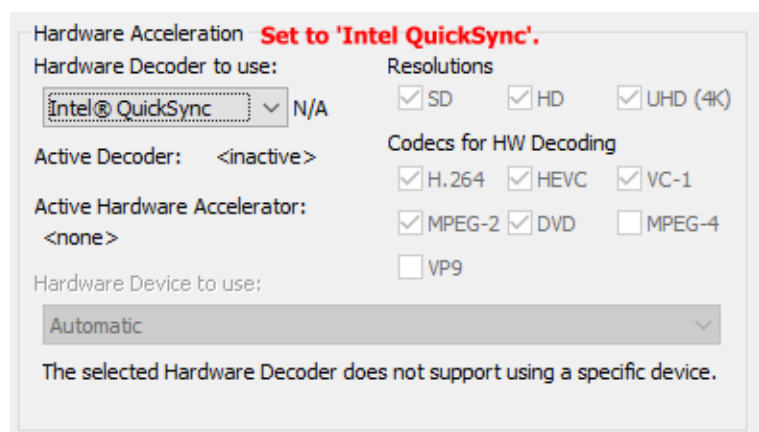
Also enable the UHD (4k) option if you have PureVideo 5 or later GPUs.

### Method #4 – Intel QuickSync Decoding Mode.

You need an Intel SandyBridge/IvyBridge CPU that use the LGA1155 socket and a motherboard that did not use the P67 chipset. Therefore only motherboards with the B65, H61, Q67, H67, and Z68 chipsets can be used. All Series 7 motherboard chipsets will work. Windows 7 and later is recommended. Windows Vista is discouraged (no heterogenous GPU support), and Windows XP isn't supported at all.

If you want to use QuickSync ASIC for decoding while using a discrete videocard for madVR, you will need Windows 7 or later. If you only have Windows 7, you need to enable the QuickSync headless mode by following the steps in this [link](#). If you have Windows 8, you do not have to do so.

Always make sure that you are using the latest drivers available from Intel's website, not the ones that comes from the motherboard manufacturer' websites, or the CD. Older driver versions may cause the decoder to fail.



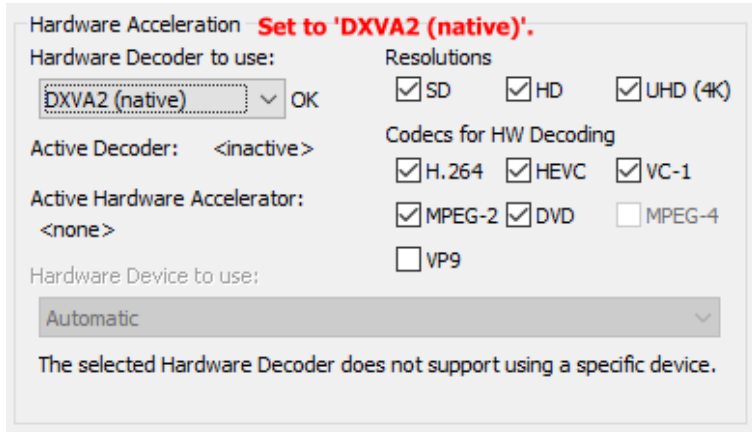
If you have an Ivy Bridge CPU or newer, you can also enable UHD (4K) option; you need to have the latest drivers of course. HEVC can only be supported if your GPU expose the 'HEVC\_VLD\_Main' mode in DXVA Checker. Will decode only 8-bit HEVC videos fully in hardware, 10-bit decoding will be done in hybrid mode. VP9 is supported is your GPU expose the 'VP9\_VLD\_Profile0' mode in DXVA Checker.

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### Method #5 – native DXVA decoding mode.

**Works only in Windows Vista and later.** Should only be used by owners of Intel G45 chipset, Clarkdale and Arrandale CPUs, ATI HD3xxx, HD4xxx and HD5xxx GPUs. But all other GPUs/iGPUs that can use QuickSync/CUVID/DXVA renderless decoding methods should also be able to use this mode. Doesn't work on Hi10p videos and other unsupported video formats, and will fall into high performance software decoding mode when such files are played.



HEVC can only be supported if your GPU expose the 'HEVC\_VLD\_Main' and/or 'HEVC\_VLD\_Main10' modes in DXVA Checker. VP9 is supported if your GPU expose the 'VP9\_VLD\_Profile0' mode in DXVA Checker.

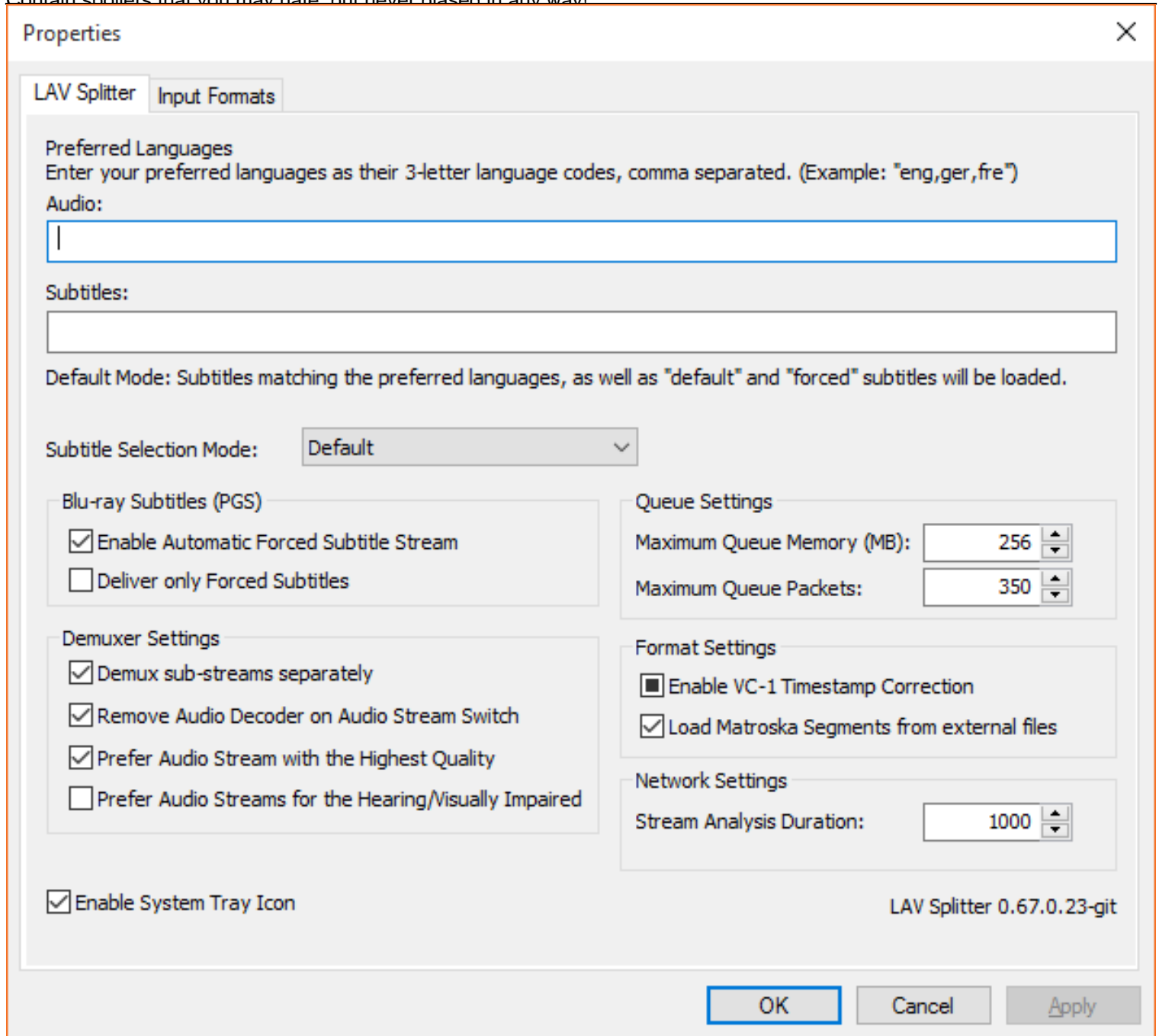
Click 'Apply' button to save your settings, then click the 'OK' button to close the property page.

### Step 3 – Configuring LAV Splitter Source and LAV Audio Decoder

Go to 'Start Menu —> All Programs —> LAV Filters —> LAV Splitter Configuration' to bring up LAV Splitter property page. For Windows 8 users, the shortcut should be somewhere in the Metro Start page. 'LAV Splitter' property page will appear below.

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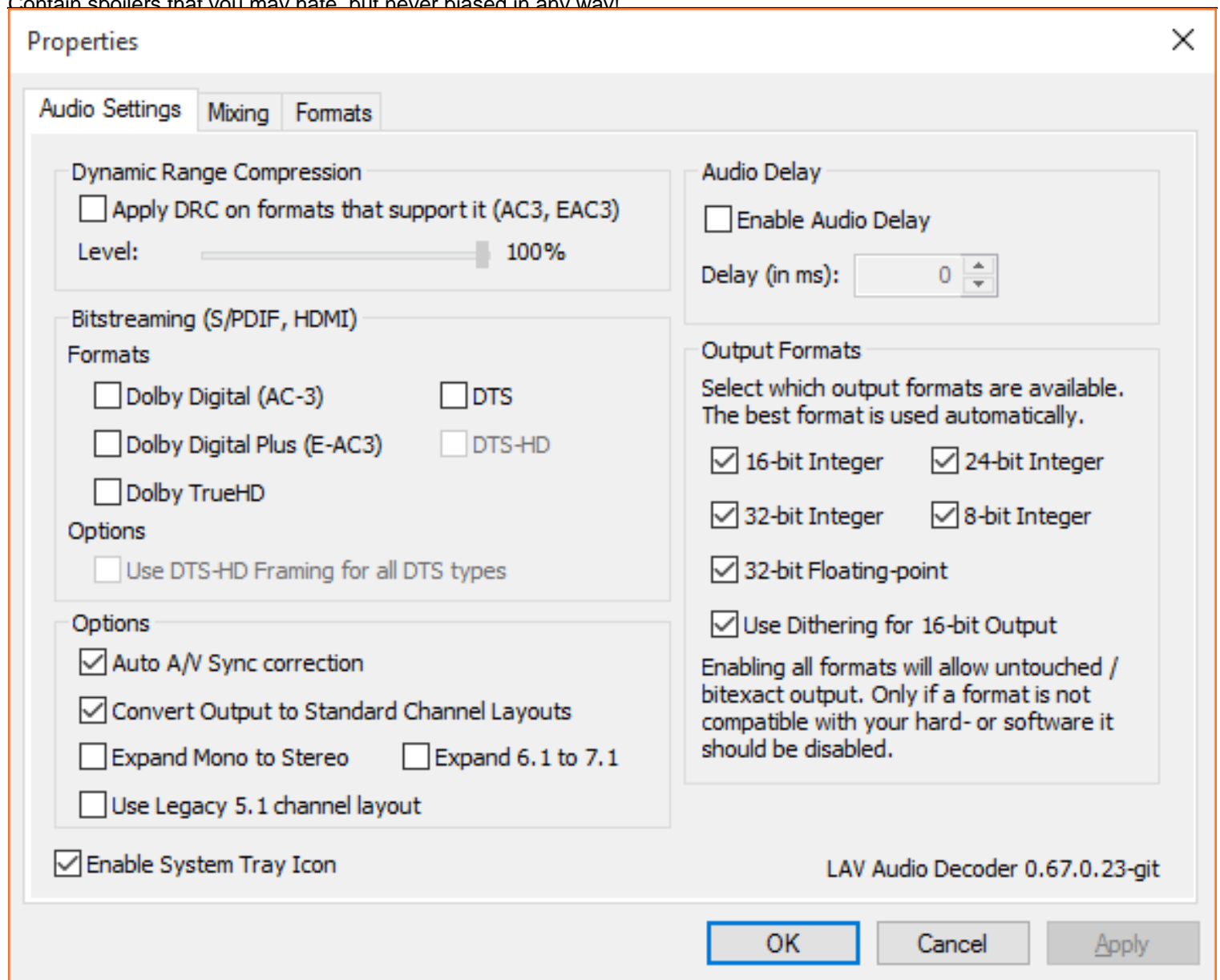


Leave everything here exactly as shown above. You're welcome to play around with automatic audio/subtitles track selection routine though to suit your needs. Verify that everything is in order, click 'Apply' and then click 'OK' to close the property page.

Go to 'Start Menu —> All Programs —> LAV Filters —> LAV Audio Configuration' to bring up LAV Audio Decoder property page. For Windows 8 users, the shortcut should be somewhere in the Metro Start page. 'LAV Audio Decoder' property page will appear below.

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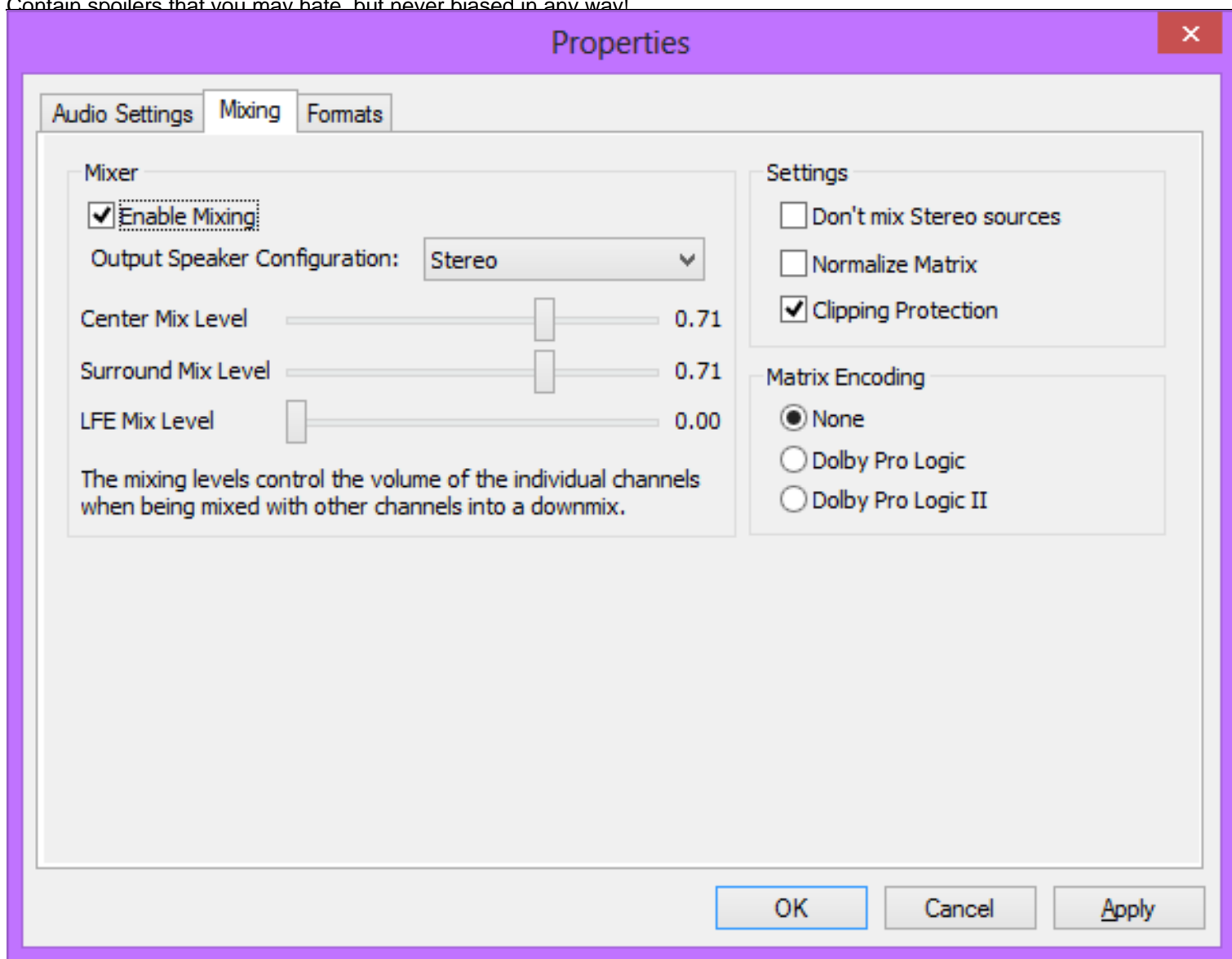


Enable any audio codec you want to bitstream here. If bitstreaming DTS-HD MA, do not enable 'Use DTS-HD Framing for all DTS types' unless your receiver needs it.

Go to the 'Mixing' tab and enable the 'Enable Mixing' option. Set the 'Output Speaker Configuration' option to match your speaker setup

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For example, if you have a stereo speaker system, change the 'Output Speaker Configuration' option drop-down menu to use 'Stereo'. Verify that everything is in order, click 'Apply' and then click 'OK' to close the property page.

## Step 4 – Configuring madVR

Click [here](#) to read how to configure madVR.

If you have any problems, make a comment below with the screenshots of your DXVA Checker, GPU-Z and CPU-Z results like in the example below.



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The image shows three software windows. The top window is 'DXVA Checker' with a list of video codecs and their supported profiles. The bottom-left window is 'TechPowerUp GPU-Z 0.7.2' showing details for an Intel(R) HD Graphics 4000. The bottom-right window is 'TechPowerUp GPU-Z 0.7.2' showing details for an NVIDIA GeForce GTX 760. The middle window is 'CPU-Z' showing details for an Intel Core i7 3770S processor.

Codec	Profile
MPEG2_IDCT	DXVA2/D3D11 SD / HD / FHD / QFHD
MPEG2and1_VLD	DXVA2/D3D11 SD / HD / FHD / QFHD
MPEG2_VLD	DXVA2/D3D11 SD / HD / FHD / QFHD
MPEG2_A	DXVA1 SD / HD / FHD / QFHD
MPEG2_C	DXVA1 SD / HD / FHD / QFHD
MPEG1_VLD	DXVA2/D3D11 SD / HD / FHD / QFHD
VC1_VLD2010	DXVA2/D3D11 SD / HD / FHD
VC1_VLD	DXVA2/D3D11 SD / HD / FHD
VC1_IDCT	DXVA1/2/D3D11 SD / HD / FHD
WMV9_IDCT	DXVA1/2/D3D11 SD / HD / FHD
32FCFE3F-DE46-4A49-861B-AC71110649D5	DXVA2/D3D11 SD / HD / FHD / QFHD
H264_VLD_Stereo_Progressive_NoFGT	DXVA2/D3D11 SD / HD / FHD / QFHD
H264_VLD_Stereo_NoFGT	DXVA2/D3D11 SD / HD / FHD / QFHD
H264_VLD_NoFGT	DXVA2/D3D11 SD / HD / FHD / QFHD
1B81BE6A-A0C7-11D3-B984-00C04F2E73C5	DXVA2/D3D11 SD / HD / FHD / QFHD
H264_VLD_SVC_Scalable_Constrained_High	DXVA2/D3D11 SD / HD / FHD / QFHD
MPEG4pt2_VLD_Simple	DXVA2/D3D11 SD / HD / FHD
MPEG4pt2_VLD_AdvSimple_NoGMC	DXVA2/D3D11 SD / HD / FHD
9947EC6F-689B-11DC-A320-0019DBBC4184	DXVA2/D3D11 SD / HD / FHD
B194EB52-19A0-41F0-B754-CC244AC1CB20	DXVA2/D3D11 SD / HD / FHD / QFHD
6AFFD11E-1D96-42B1-A215-93A31F09A53D	DXVA2/D3D11 SD / HD / FHD / QFHD

Graphics Card	Name	GPU	Technology	Release Date	BIOS Version	Device ID	ROPs/TMUs	Shaders	Pixel Fillrate	Texture Fillrate	Memory Type	Memory Size	Driver Version	GPU Clock	Memory	Shader	Default Clock	Multi-GPU	Computing
Intel(R) HD Graphics 4000	GT2	22 nm	Apr 23, 2012	Unknown	8086 - 0162	2 / 4	16 Unified	1.3 GPixel/s	2.6 GTexel/s	DDR3	0 MB	igdumd64 9.18.10.3165 / Win8 64	650 MHz	800 MHz	N/A	650 MHz	Disabled	<input type="checkbox"/> OpenCL <input type="checkbox"/> CUDA <input checked="" type="checkbox"/> PhysX <input checked="" type="checkbox"/> DirectCompute 5.0	
NVIDIA GeForce GTX 760	GK104	28 nm	Jun 25, 2013	80.04.BF.00.44 (P2004-0010)	10DE - 1187	32 / 96	1152 Unified	35.6 GPixel/s	106.7 GTexel/s	GDDR5	2048 MB	nvlddmkm 9.18.13.2049 (ForceWare 320.49) / Win8 64	1111 MHz	1552 MHz	Boost 1176 MHz	1111 MHz	Disabled	<input checked="" type="checkbox"/> OpenCL <input checked="" type="checkbox"/> CUDA <input checked="" type="checkbox"/> PhysX <input checked="" type="checkbox"/> DirectCompute 5.0	

Processor	Name	Code Name	Package	Technology	Specification	Family	Ext. Family	Instructions	Clocks (Core #0)	Cache	Selection	Cores	Threads
Intel Core i7 3770S	Ivy Bridge	Socket 1155 LGA	22 nm	Intel(R) Core(TM) i7-3770S CPU @ 3.10GHz	6	6	MMX, SSE, SSE2, SSE3, SSSE3, SSE4.1, SSE4.2, EM64T, VT-x, AES, AVX	Core Speed: 1601.69 MHz, Multiplier: x 16.0 (16 - 39), Bus Speed: 100.11 MHz	L1 Data: 4 x 32 KBytes 8-way, L1 Inst: 4 x 32 KBytes 8-way, Level 2: 4 x 256 KBytes 8-way, Level 3: 8 MBytes 16-way	Processor #1	4	8	

## MISCELLANEOUS

- With the removal of ffdshow raw video filter, if you want to deband your videos, you have to use JanWillem32 deband pixel shader script (which is included in the LAV Filters package above) or madVR. Those two methods need a reasonably powerful GPU to run effectively though. No iGPU like Intel HD4000 and AMD/nVidia solutions can handle it, and some models of low-end discrete GPU may have problems too.

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