HTPC

Versie: 23 November 2015

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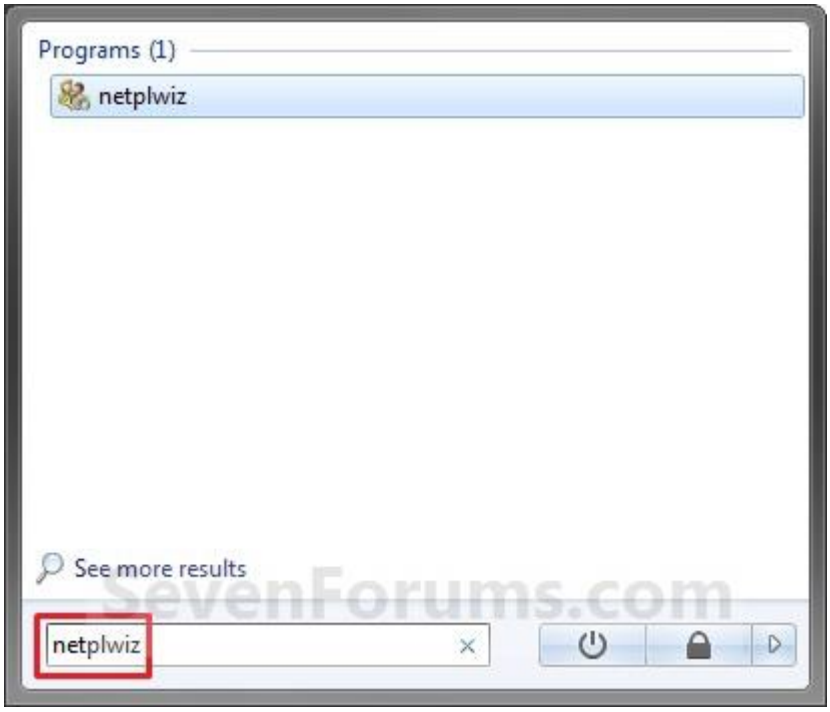
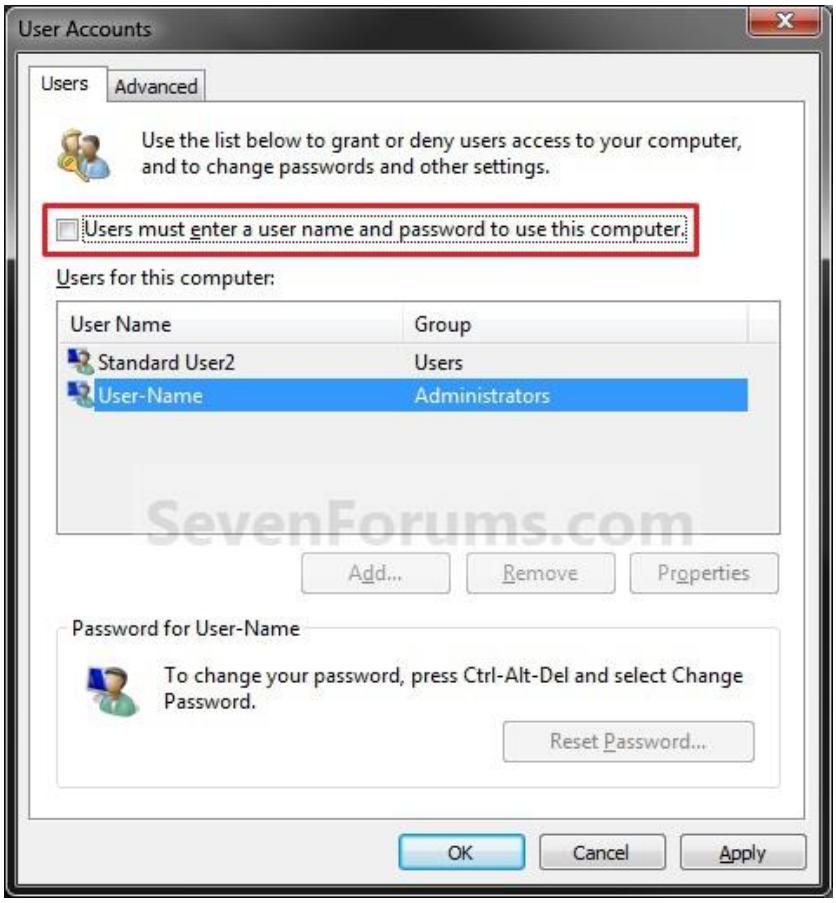
1. Benodigde software

- Windows 7 of hoger
- Kodi DSPLAYER
  http://www.mediafire.com/download/6ot6y4fyaybtti5/KodiSetup-20151019-f273f06-Isengard_dsplayer_dx11.exe
  Latest Stable release with madVR support up to v0.89.13
- MadVR (download versie compatible met Kodi DSPLAYER release!)
  - http://www.madvr.com/
  - http://www.videohelp.com/download/madVR0896.zip
- SVP 4
  - http://www.svp-team.com
- Reclock
  - Included in SVP4
- LAV filters
  - Included in Kodi DSPLAYER
- XY-subfilter
  - Included in Kodi DSPLAYER
- FFDshow
  - http://ffdshow-tryout.sourceforge.net/
  - http://sourceforge.net/projects/ffdshow-tryout/files/latest/download

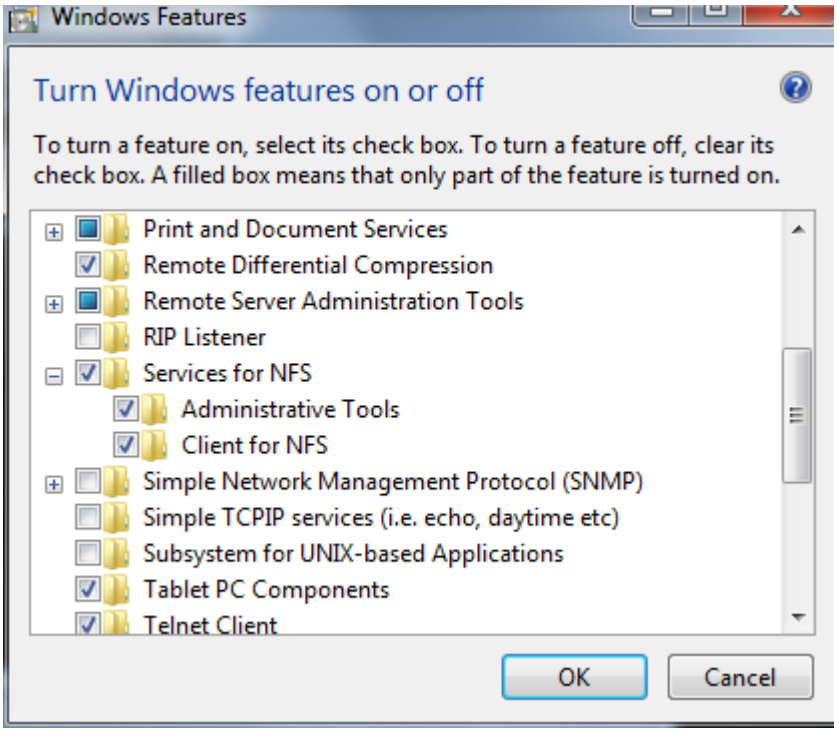
2. Installatie/configuratie Windows 7

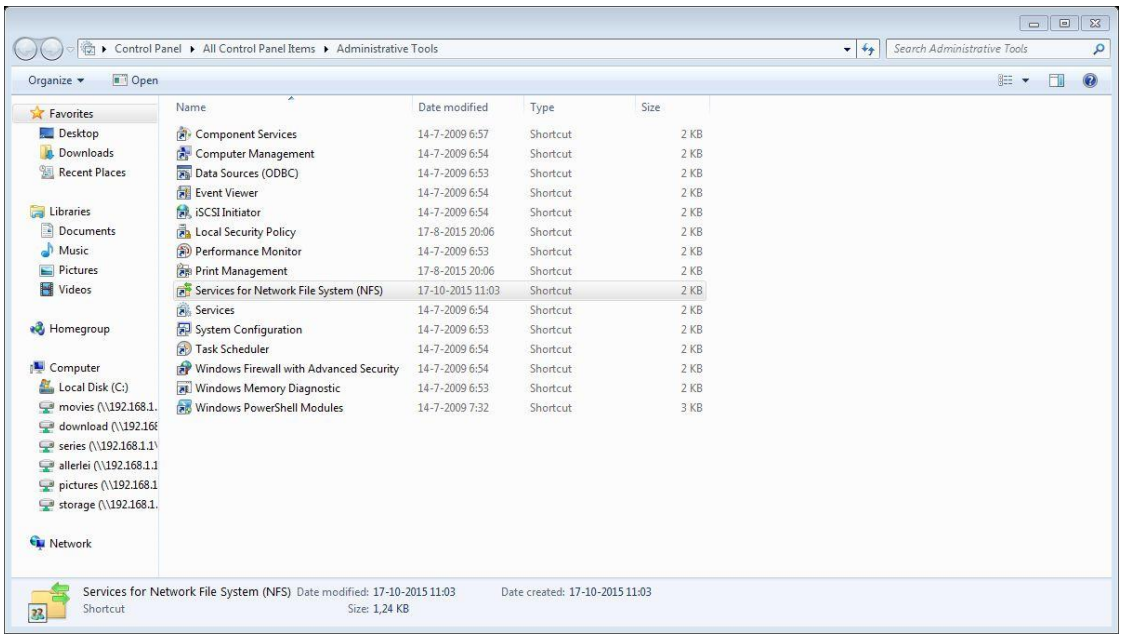
- Installeer Windows 7
- Installeer moederbord chipset drivers
- Installeer nieuwste nvidia videokaart driver
- Ken een vast ip adres toe aan de network adapter
- Maak een gebruiker aan
- Zorg dat deze gebruiker automatisch inlogged
    - netplwiz
    - 

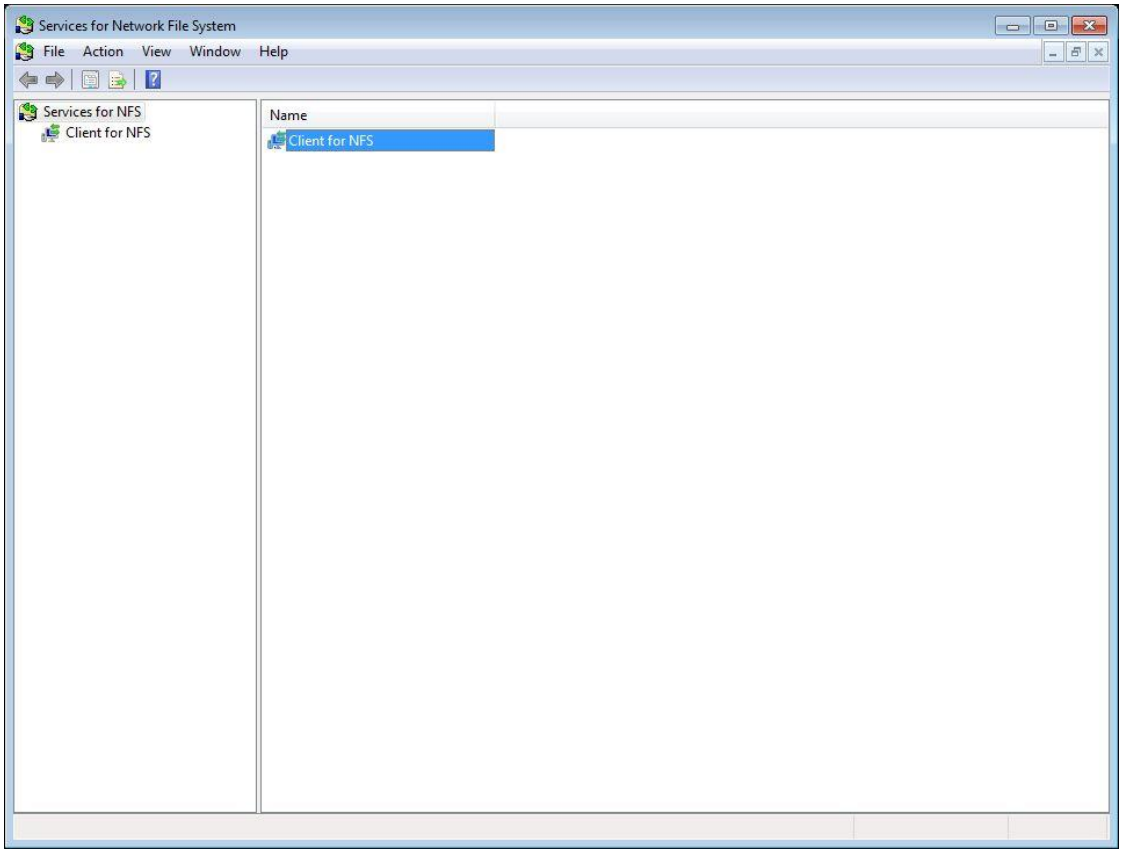
- Wegens issues met de Desktop Window Manager (welke alleen benodigd is voor leuke grafische effecten op de desktop, die ik toch niet gebruik) service, heb ik deze disabled.

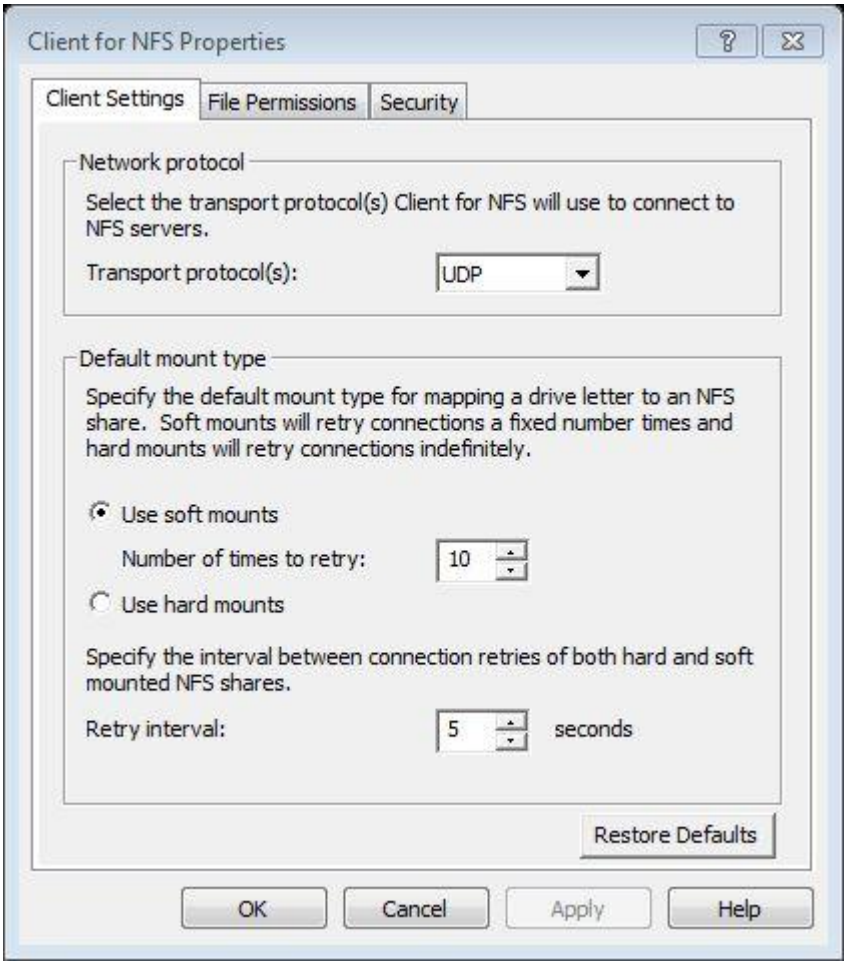


- Voeg Kodi toe aan het startmenu
- Wijzig het power schema zodat de pc niet vanzelf in slaap modus gaat
- Zet nfs client service aan en wijzig de instellingen naar UDP en meerdere retries:




Control Panel ▸ All Control Panel Items ▸ Administrative Tools
Search Administrative Tools
Organize
Open
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
Local Disk (C:)
movies (\\192.168.1.
download (\\192.168
series (\\192.168.1.1\
allerlei (\\192.168.1.1
pictures (\\192.168.1
storage (\\192.168.1.
Network
Name
Date modified
Type
Size
Component Services 14-7-2009 6:57 Shortcut 2 KB
Computer Management 14-7-2009 6:54 Shortcut 2 KB
Data Sources (ODBC) 14-7-2009 6:53 Shortcut 2 KB
Event Viewer 14-7-2009 6:54 Shortcut 2 KB
iSCSI Initiator 14-7-2009 6:54 Shortcut 2 KB
Local Security Policy 17-8-2015 20:06 Shortcut 2 KB
Performance Monitor 14-7-2009 6:53 Shortcut 2 KB
Print Management 17-8-2015 20:06 Shortcut 2 KB
Services for Network File System (NFS) 17-10-2015 11:03 Shortcut 2 KB
Services 14-7-2009 6:54 Shortcut 2 KB
System Configuration 14-7-2009 6:53 Shortcut 2 KB
Task Scheduler 14-7-2009 6:54 Shortcut 2 KB
Windows Firewall with Advanced Security 14-7-2009 6:54 Shortcut 2 KB
Windows Memory Diagnostic 14-7-2009 6:53 Shortcut 2 KB
Windows PowerShell Modules 14-7-2009 7:32 Shortcut 3 KB
Services for Network File System (NFS) Date modified: 17-10-2015 11:03 Date created: 17-10-2015 11:03
Shortcut Size: 1,24 KB


Services for Network File System
File Action View Window Help
Services for NFS
Client for NFS
Name
Client for NFS



- In principe zou eenmalig met de hand mounten van de nfs shares voldoende zijn, echter dit blijkt onder Windows 7 niet betrouwbaar te werken, soms is na een boot een share “disconnected”. Workaround: zet een script genaamd “0mountagain.bat” (de 0 aan het begin van de naam is om te zorgen dat eerst het script gestart wordt en dan pas kodi) met de volgende inhoud in startup (de ping is om voor een paar seconden vertraging te zorgen):
    - ping 127.0.0.1
    - mount 192.168.1.1:/video/movies m:
    - mount 192.168.1.1:/video/download n:
    - mount 192.168.1.1:/video/series o:
    - mount 192.168.1.1:/video/allerlei p:
    - mount 192.168.1.1:/pictures q:

3. Software Omschrijving

3.1 Kodi DSPLAYER

DSPlayer is a DirectShow-based media player for Kodi Entertainment Center. DSPlayer development is handled through its own branch, which is kept in sync with changes to the official Kodi codebase.

The player is designed to work with or replace the default Kodi media player, DVDPlayer, while offering full integration with the existing Kodi interface. This means all media databases and player controls will function in the same manner as a standard Kodi installation.

DSPlayer is installed on Windows operating systems through custom installation packages, which are made available in conjunction with official releases of Kodi.

3.2 Reclock

The main benefit of ReClock is eliminating the frame drops that occur due to the framerate of the video (display) clock not perfectly matching the audio clock. This typically happens with 24Hz material that is actually rendered at 23.976 fps. A number of factors including the specific A/V equipment and GPU used can lead to reported framerates that differ by decimal places from the actual rate of consumption by the display. A reported 23.972 fps from the video clock, for example, can lead to one dropped frame per minute. These frame drops are clock corrections called clock jitter.

ReClock syncs the clocks by resampling the audio. The audio stream is unpacked as multichannel PCM and slowed down or sped up by inaudible amounts to match the required composition rate. With ReClock in place, dropped frames should be eliminated or reduced to one per hour at most.

3.3 MadVR

madVR is a high quality video renderer (GPU assisted). features:

- high quality chroma upsampling
- high quality scaling (bicubic, mitchell, lanczos, spline etc)
- high quality YCbCr -> RGB conversion
- gamut & gamma correction for display calibration
- full 16bit processing queue
- final 16bit processing result is dithered down to RGB output bitdepth
- bypasses graphics card's video (damage) algorithms
- all work is done via GPU shaders
- no shortcuts, highest quality has priority over anything else.
- Both 32bit and 64 bit version included.

The quality of madVR with LAV Filters is capable of besting even high-end Blu-ray players such as the Oppo BDP-103D with a capable graphics card and some knowledge of correct set-up.

It should offer an immediate advantage over DVDPlayer, where output is done at 8-bits without dithering. madVR offers full 16-bit processing dithered to 10-bits or less.

madVR also comes packaged with advanced scaling algorithms such as Jinc, super-xbr and NNEDI3, which possess less ringing and lower levels of aliasing than traditional resizers.

Its dithered output will produce a more precise image with fewer rounding errors and less overall noise, while its upscaling is capable of rendering a cleaner, sharper image. This should even be apparent with content displayed at its native resolution.

3.4 ffdshow tryouts

ffdshow tryouts is a DirectShow and Video for Windows codec with support for a wide range of audio and video formats, such as Xvid, DivX, and H.264.

It includes a powerful filter set that can enhance the video quality - with filters for resizing, deinterlacing, and displaying subtitles - as well as audio quality through normalization, down-/upmixing, and resampling.

4. Configuratie

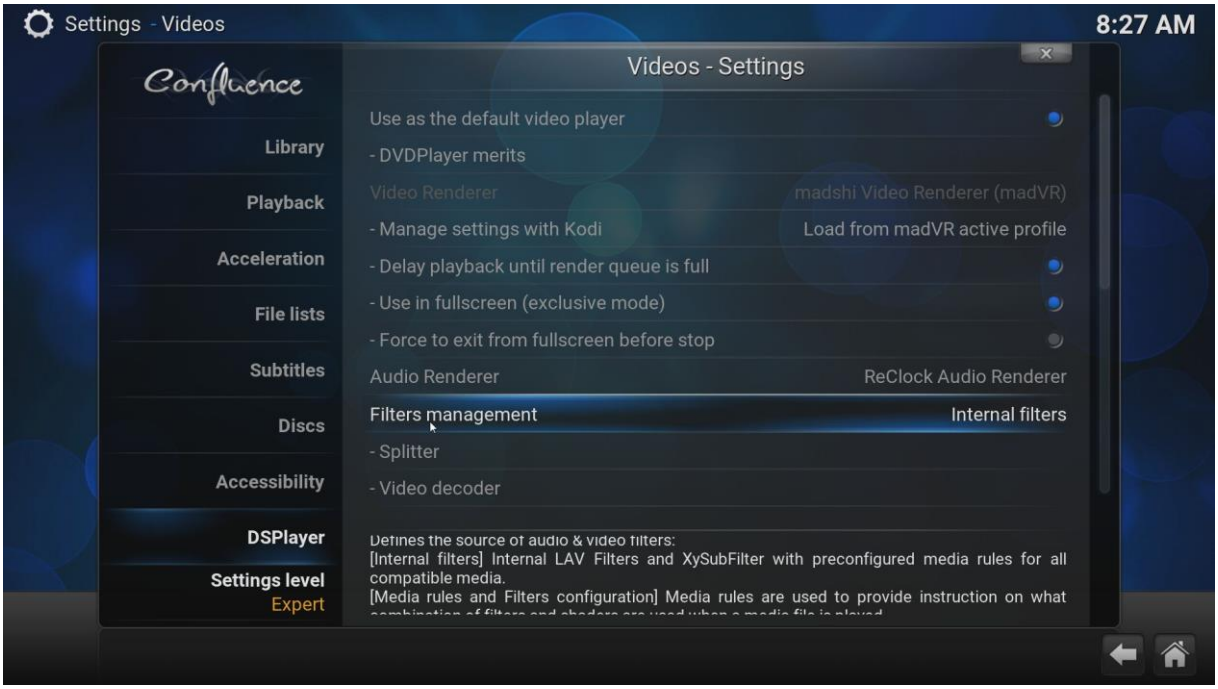
4.1 Kodi

4.1.1 Disable Kodi RSS feeds

- Delete Kodi Program Files RSSFeeds.xml
- Delete Kodi Userdata RSSFeeds.xml

4.1.2 Kodi DSPLAYER SET-UP

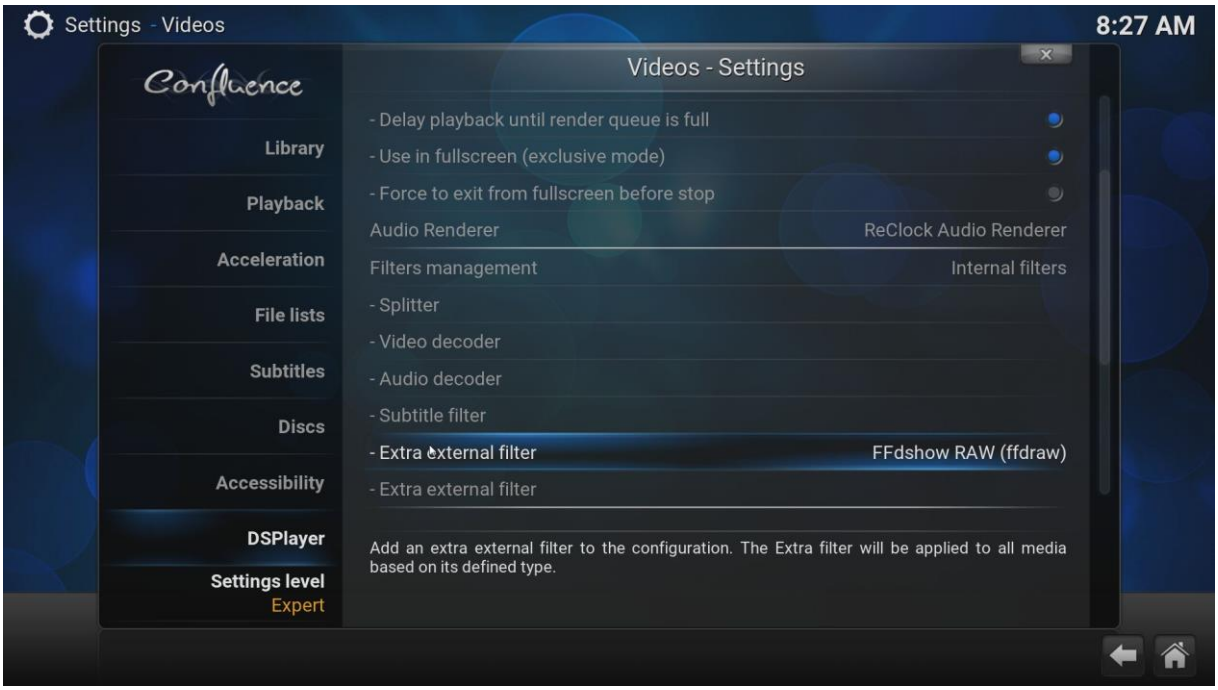
DSPlayer is configured from the Kodi GUI (System -> Video -> DSPlayer).



Ensure **Internal filters** is selected from this menu to leverage the installed LAV Filters and XySubFilter. To confirm the correct filters are being loaded during playback, **press O** while playing any video.

Enable to use internal copies of LAV Filters and XySubFilter in place of external filters. When selected, the creation of media rules is not required as compatible media is pre-configured to use these filters.

It may also be desirable to add an external filter to take advantage of features not provided by DSPlayer's internal filters. Three external filter slots are available.



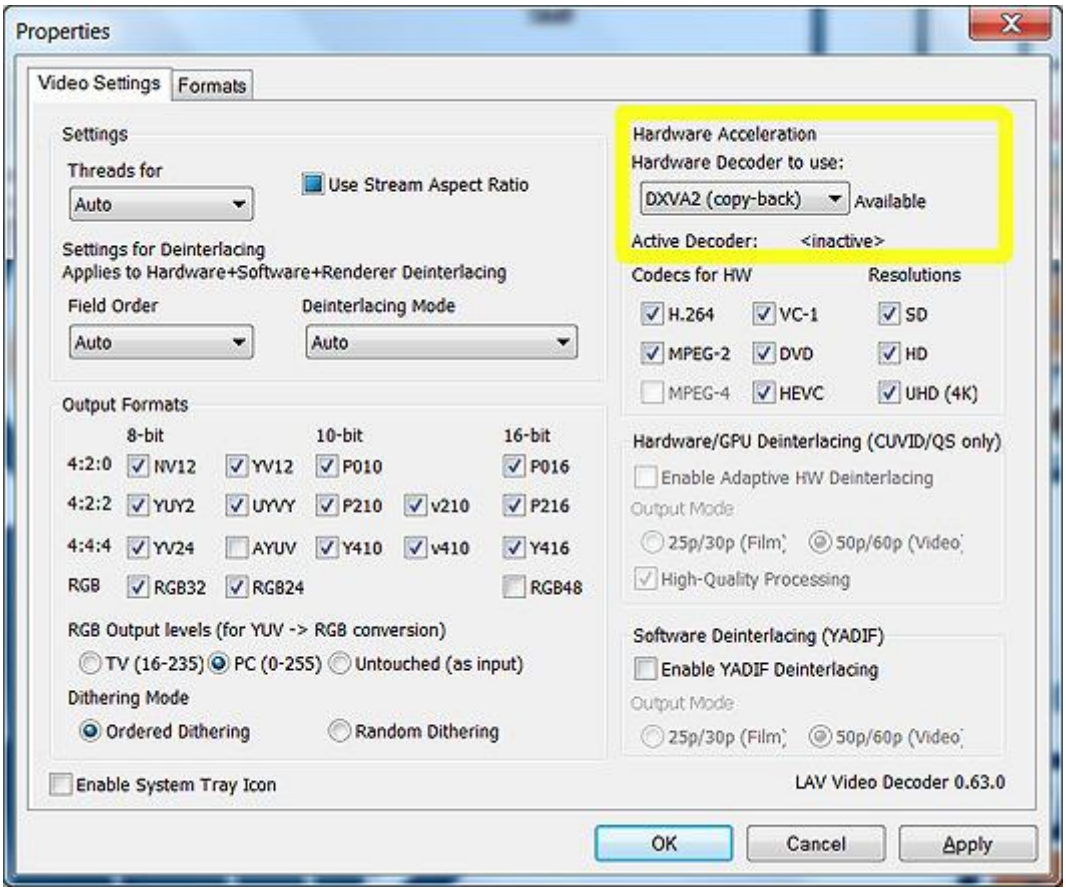
A common example of this is FFDShow, which should be added as an extra filter to use features such as the SmoothVideo Project (SVP).

- *Splitter:* Configure (i) LAV Splitter.

Merk op dat:

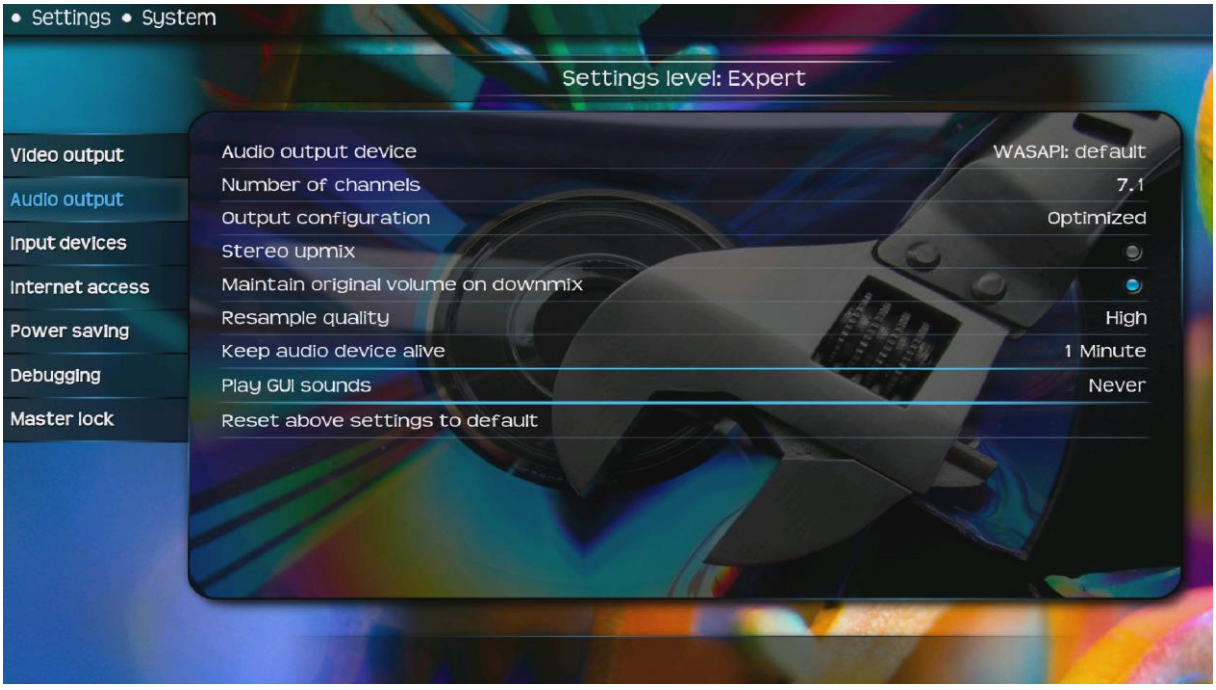
- De subtitle selection mode op default dient te staan.
- De preferred audio language op engels (eng) staat.
- De preferred subtitle language nederlands (dut) is met als tweede keuze engels (eng).
- de PSG forced subtitle opties uit staan.
- Prefer audio stream with highest quality aan staat.

- Video decoder: Configure (i) LAV Video.



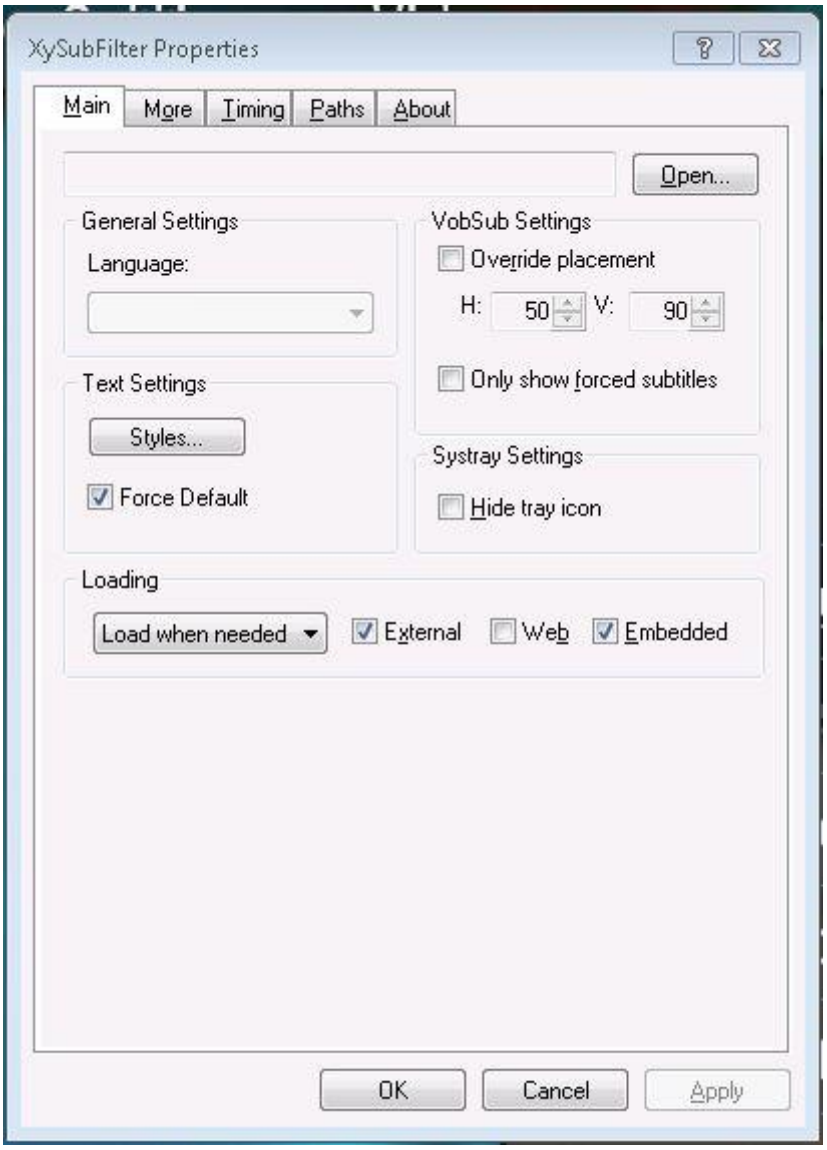
- Audio decoder: Configure (i) LAV Audio.

Merk op dat ik geen bitstreaming audio gebruik, maar PCM, dit om audio dropouts te voorkomen (zie het ReClock hoofdstuk).



In de Kodi Audio settings definieer ik WASAPI: default als audio output device. Ik vermoed overigens dat dit overbodig is omdat ik als audiorenderer ReClock gebruik.

- Subtitle filter: Configure (i) XySubFilter.



Merk op dat:

- Only show forced subtitles uit staat.
- Force default aan staat.
- Loading op Load when needed staat.
- Er ook een aantal subtitle settings gezet dienen te worden in Settings -> videos (zie screenshot hieronder).

- Extra external filter: Configure FFDShow RAW (ffdraw)

The most common extra filter used with DSPlayer is **FFDShow**. Adding FFDShow RAW (ffdraw), for example, makes it possible to use FFDShow-compatible applications such as the SmoothVideo Project (SVP)

4.1.3 Video Renderer

DSPlayer uses the madshi Video Renderer. madVR must be installed manually before playback. Configuration is possible during playback by choosing the madVR tray icon from the Windows Taskbar.

- Manage settings with Kodi

These settings determine the way madVR settings are managed:

Never: The Kodi madVR GUI is disabled and all madVR settings are loaded exclusively from the madVR control panel.

Load and Save with DSPlayer database: Enabling this option allows basic configuration of madVR from within Kodi. These settings are accessed during video playback by selecting *Video Settings*. Video settings are set on a per video basis but can be saved as a global profile for all videos. DSPlayer will create its own *DSPlayer Profile Group* in the madVR control panel when this setting is enabled. This is a dummy profile and not meant for external configuration. Internal settings tables always take precedence.

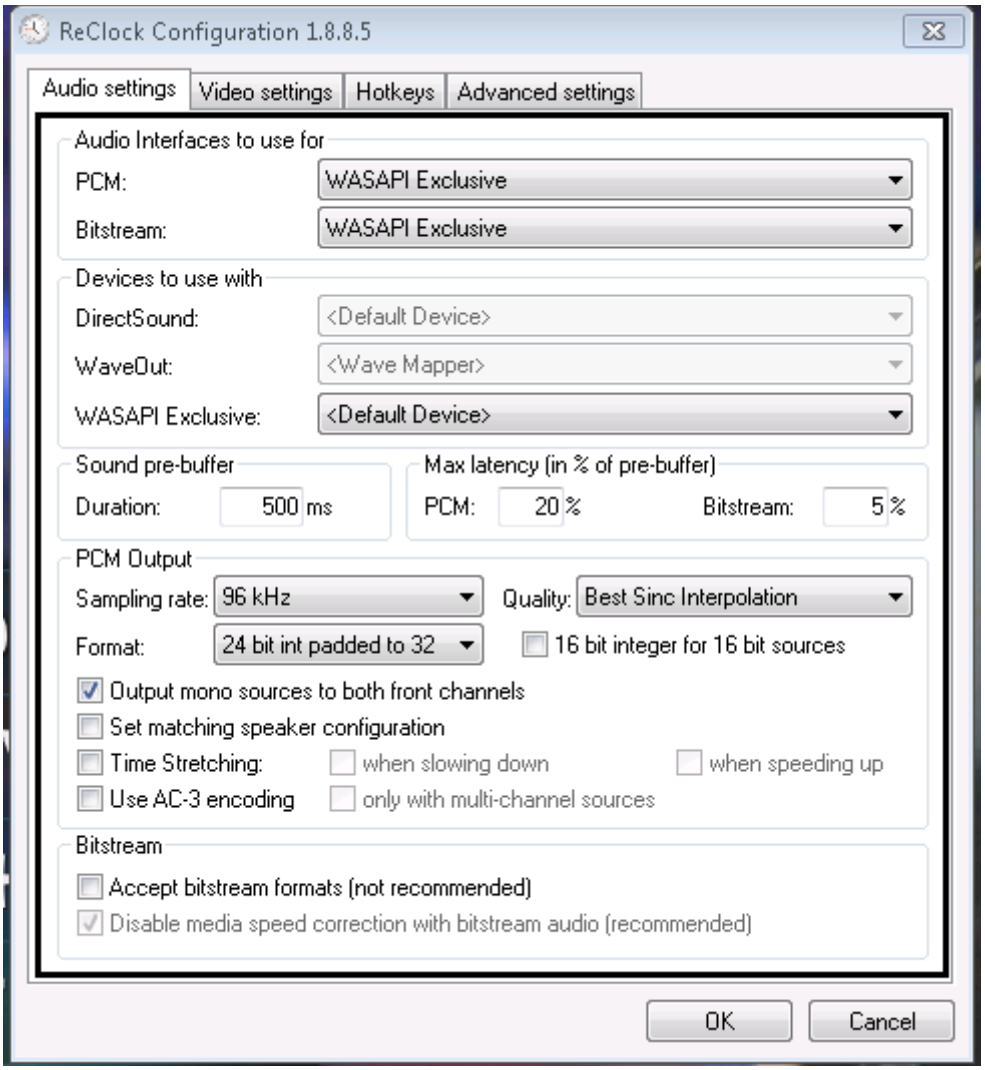
Load from madVR active profile: Upon playback, the appropriate profile is loaded from madVR for the selected video. Changes made from within Kodi will change the same value in the madVR control panel. No dummy profile is created. These changes only impact the active madVR profile and profile rules cannot be created or saved. This is the best choice for those who have set-up profiles in madVR. Any changes made to the active profile are saved externally by madVR. External settings are always loaded in place of internal Kodi tables.

Configureer de optie: ***Load from madVR active profile***

4.2 Reclock

ReClock set-up will be kept simple. To be functional, ReClock must be selected as the audio renderer under DSPlayer Settings.

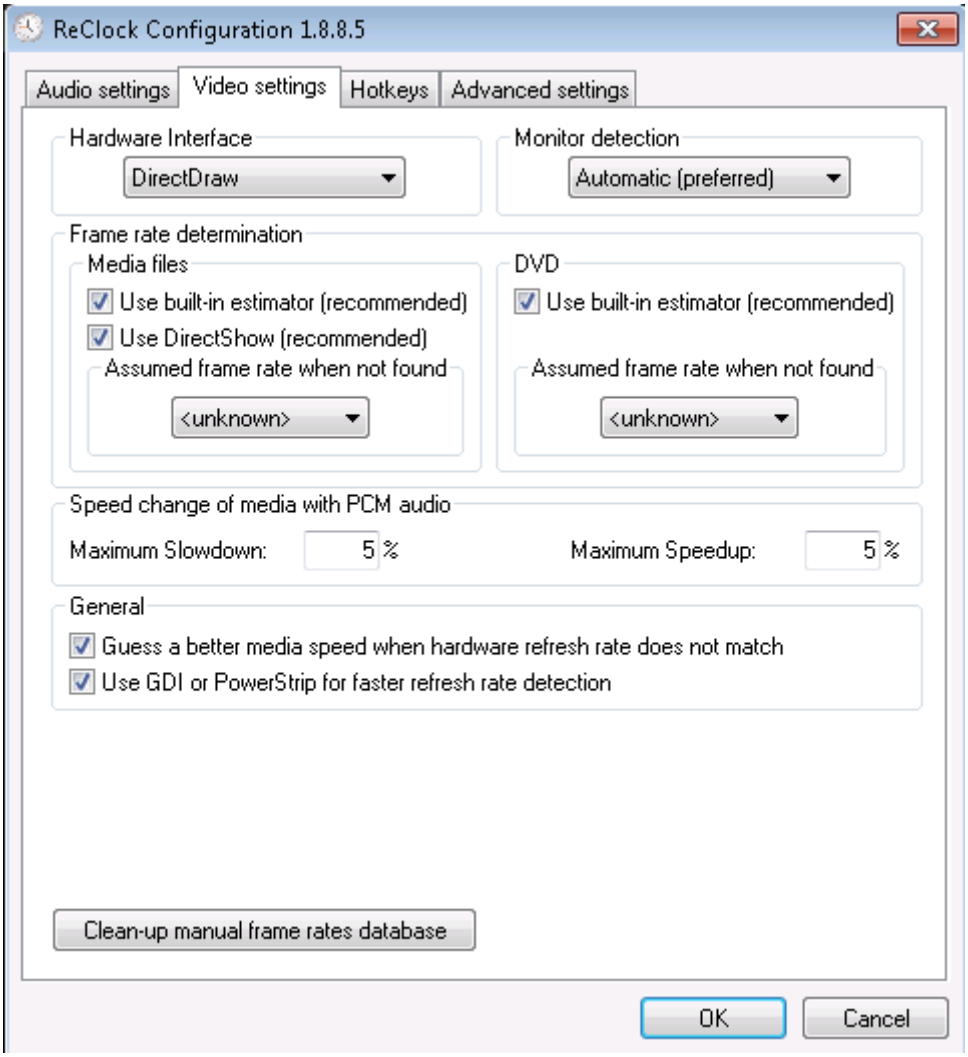
ReClock recommends sending bitstreams as multi-channel PCM. However, WASAPI Exclusive passthrough bitstreaming is possible. Since WASAPI performs no mixing or resampling this is the preferred mode for best quality audio. Exclusive Mode of operation in order that Kodi gets the exclusive rights to the audio buffers whilst playing audio streams to the exclusion of all other sounds or players. Just remember to disable media speed correction. The trade-off involves tolerating the often imperceptible frame drops at the benefit of bit-perfect bitstreaming.



Ik kies voor PCM i.p.v. bitstreaming om random audio dropouts (die ik ook daadwerkelijk kreeg) te voorkomen. Zie ook het stukje tekst hieronder:

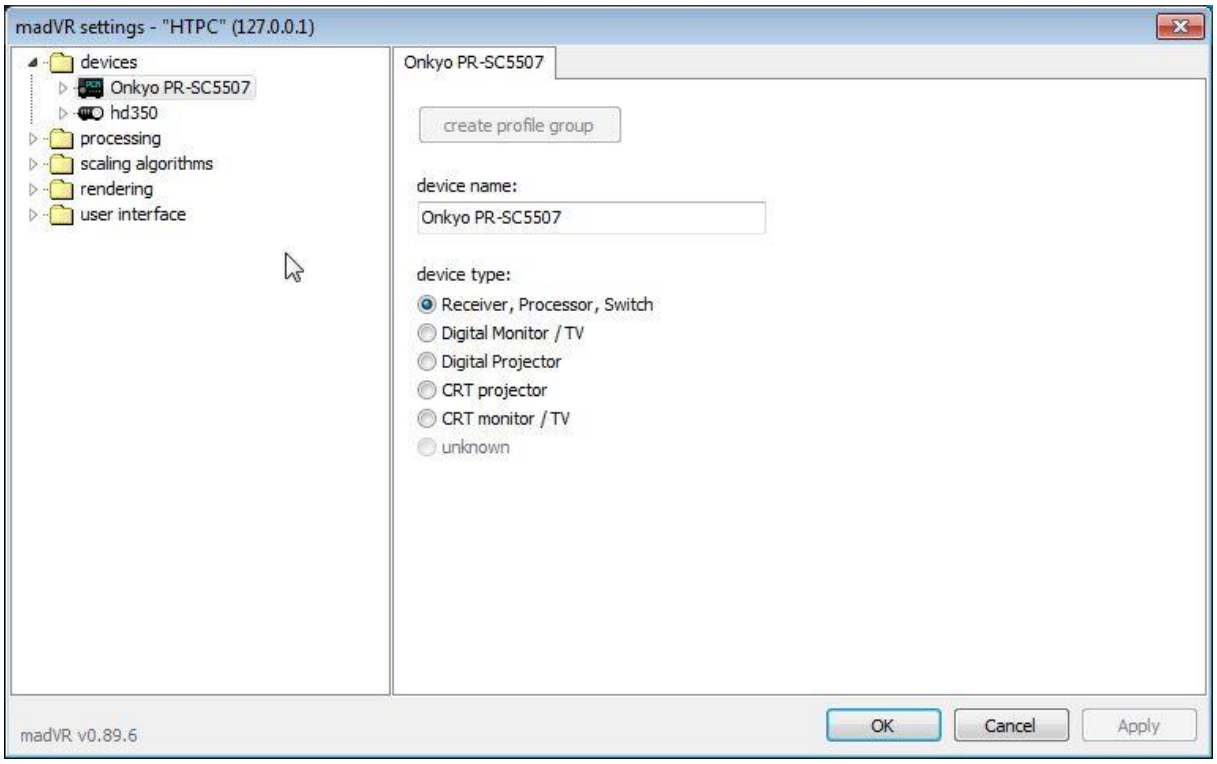
You can achieve perfect video with ReClock . If you're not bitstreaming, ReClock can resample your audio, so the audio stays properly in sync with the video. Most people will never hear the difference, and appreciate the fluid video. However, if you're bitstreaming, ReClock can not resample the audio. So instead, it has to drop or repeat an audio frame to keep the A/V sync stable - which means you will hear it (or might hear it, depending on the sound at that moment).

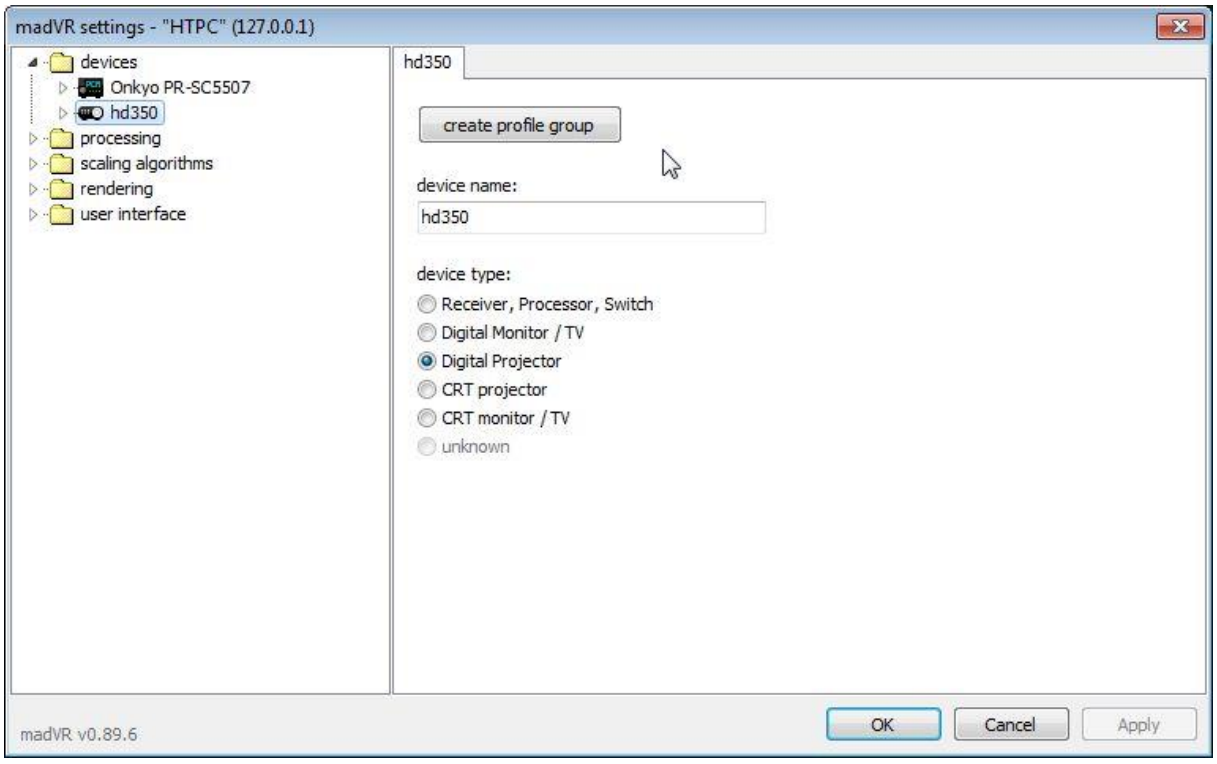
If you're bitstreaming, and you want perfect audio, there really isn't a way to avoid dropped or repeated frames without losing the A/V sync, sorry. I would suggest to simply not bitstream, and use ReClock. That way you'll get perfect video, and near-perfect audio (assuming you have a proper decoder).



De Kodi DSPayer guide raad aan om “assumed framerate” op 23,97 fps te zetten. Echter, bij het gebruik van SVP is de framerate die ReClock ziet niet meer die van de bron, maar die van de output van SVP, in mijn geval 60 fps. Dit is geen kiesbare optie, dus om die reden zet ik beiden “Assumed frame rate” opties op “Unknown” zodat ReClock zelf kan detecteren dat het om 60 fps gaat. Dit is te checken door tijdens het afspelen van video content te checken of het reclock icoontje in de icon tray groen wordt. Als deze rood of geel is dan betekent dit dat reclock zijn werk niet goed kan doen. Door te klikken op het reclock icon in de icon tray krijg de je de reclock settings te zien voor de op dat moment afgespeelde content.

4.3 MadVR


madVR settings - "HTPC" (127.0.0.1)
devices
Onkyo PR-SC5507
hd350
processing
scaling algorithms
rendering
user interface
Onkyo PR-SC5507
create profile group
device name:
Onkyo PR-SC5507
device type:
Receiver, Processor, Switch
Digital Monitor / TV
Digital Projector
CRT projector
CRT monitor / TV
unknown
madVR v0.89.6
OK
Cancel
Apply


madVR settings - "HTPC" (127.0.0.1)
devices
Onkyo PR-SC5507
hd350
processing
scaling algorithms
rendering
user interface
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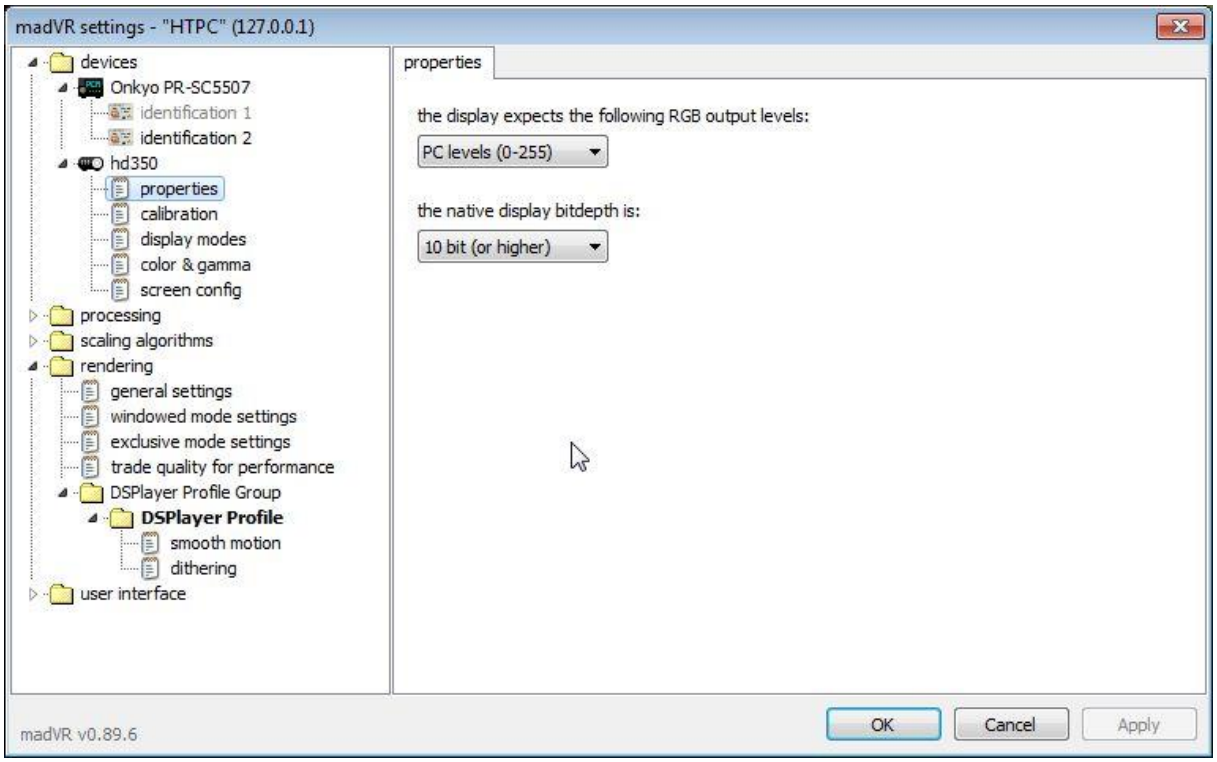
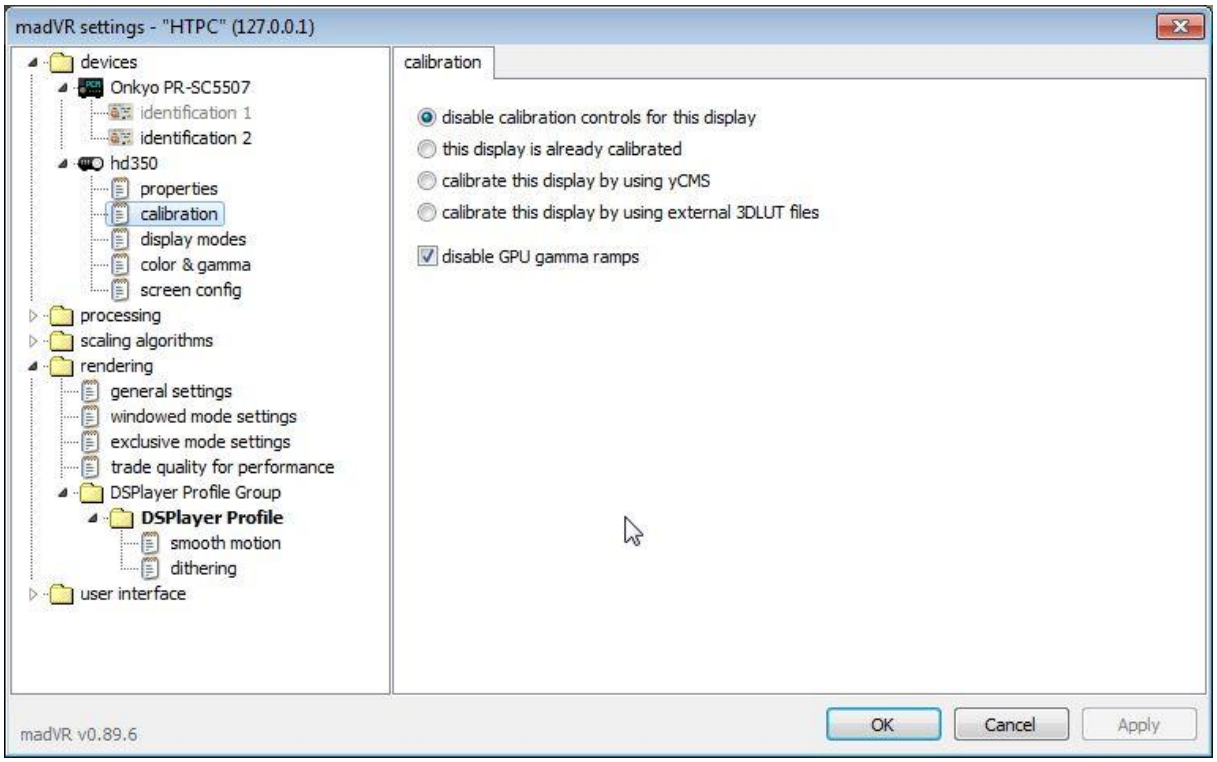
create profile group
device name:
hd350
device type:
Receiver, Processor, Switch
Digital Monitor / TV
Digital Projector
CRT projector
CRT monitor / TV
unknown
madVR v0.89.6
OK
Cancel
Apply


madVR settings - "HTPC" (127.0.0.1)
devices
Onkyo PR-SC5507
identification 1
identification 2
hd350
properties
calibration
display modes
color & gamma
screen config
processing
scaling algorithms
rendering
general settings
windowed mode settings
exclusive mode settings
trade quality for performance
DSPlayer Profile Group
DSPlayer Profile
smooth motion
dithering
user interface
properties
the display expects the following RGB output levels:
PC levels (0-255)
the native display bitdepth is:
10 bit (or higher)
madVR v0.89.6
OK
Cancel
Apply


madVR settings - "HTPC" (127.0.0.1)
devices
Onkyo PR-SC5507
identification 1
identification 2
hd350
properties
calibration
display modes
color & gamma
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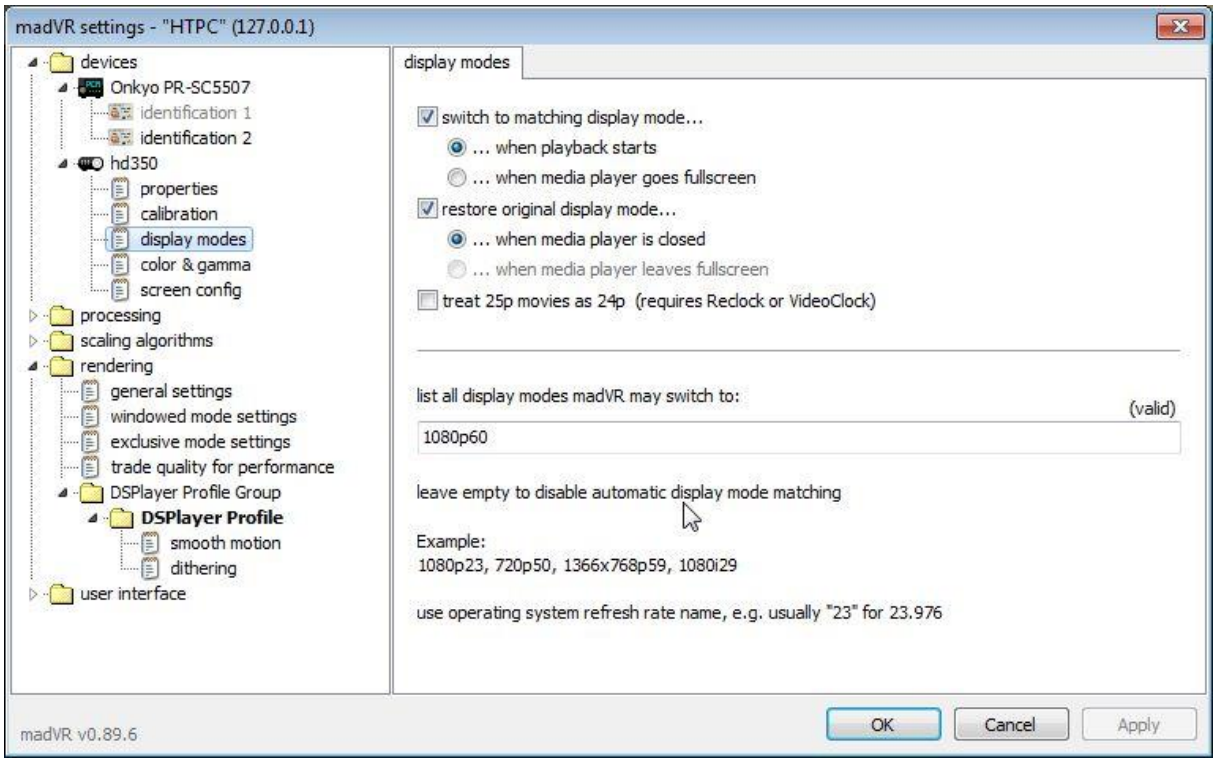
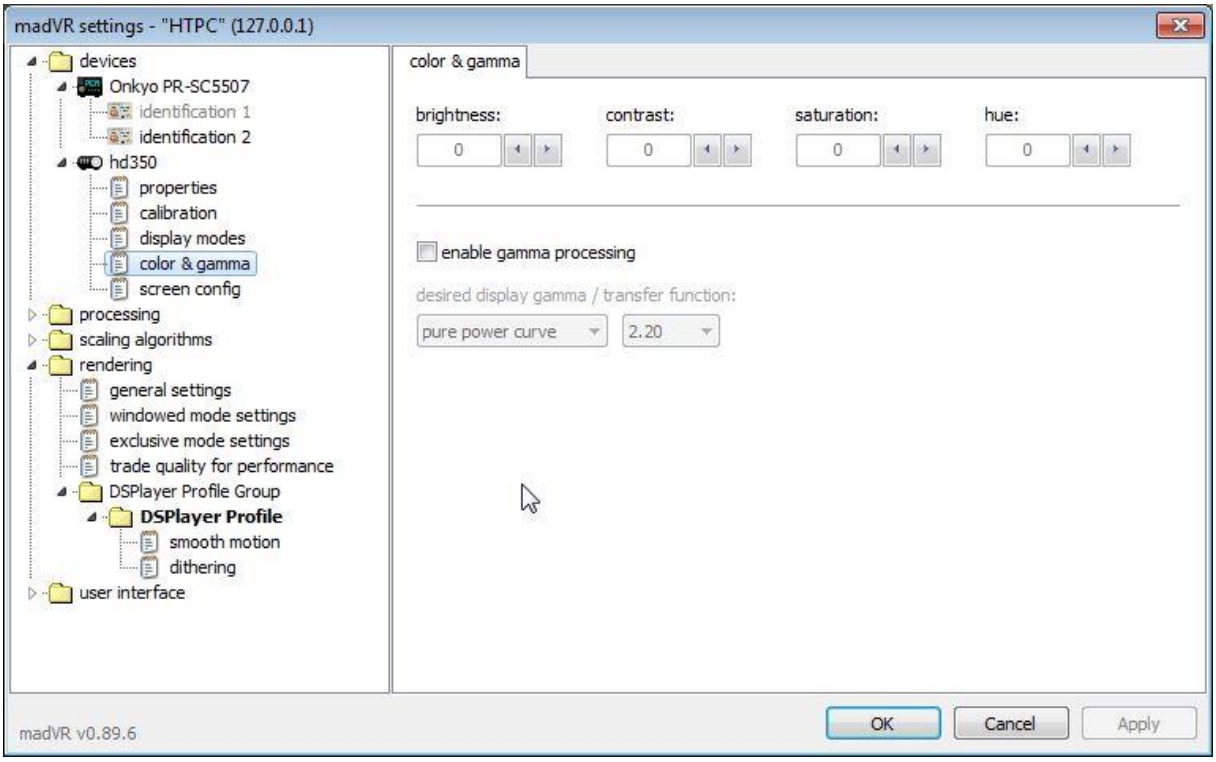
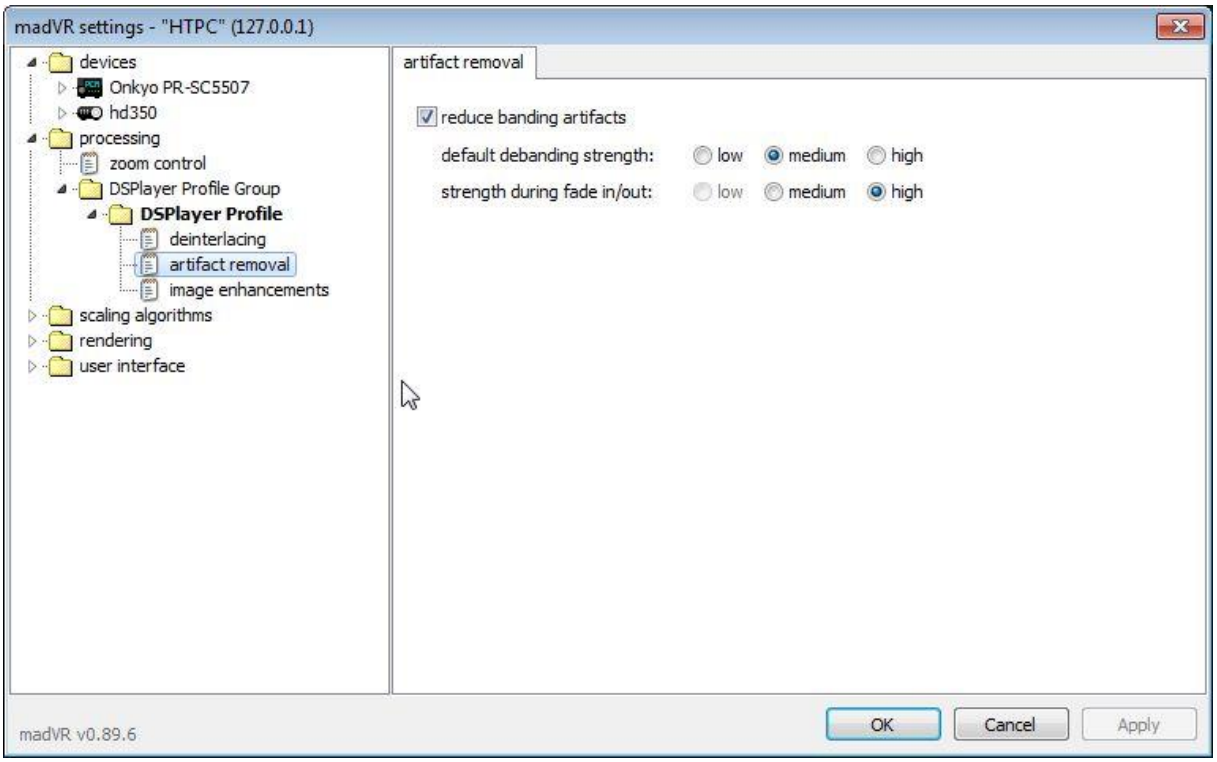
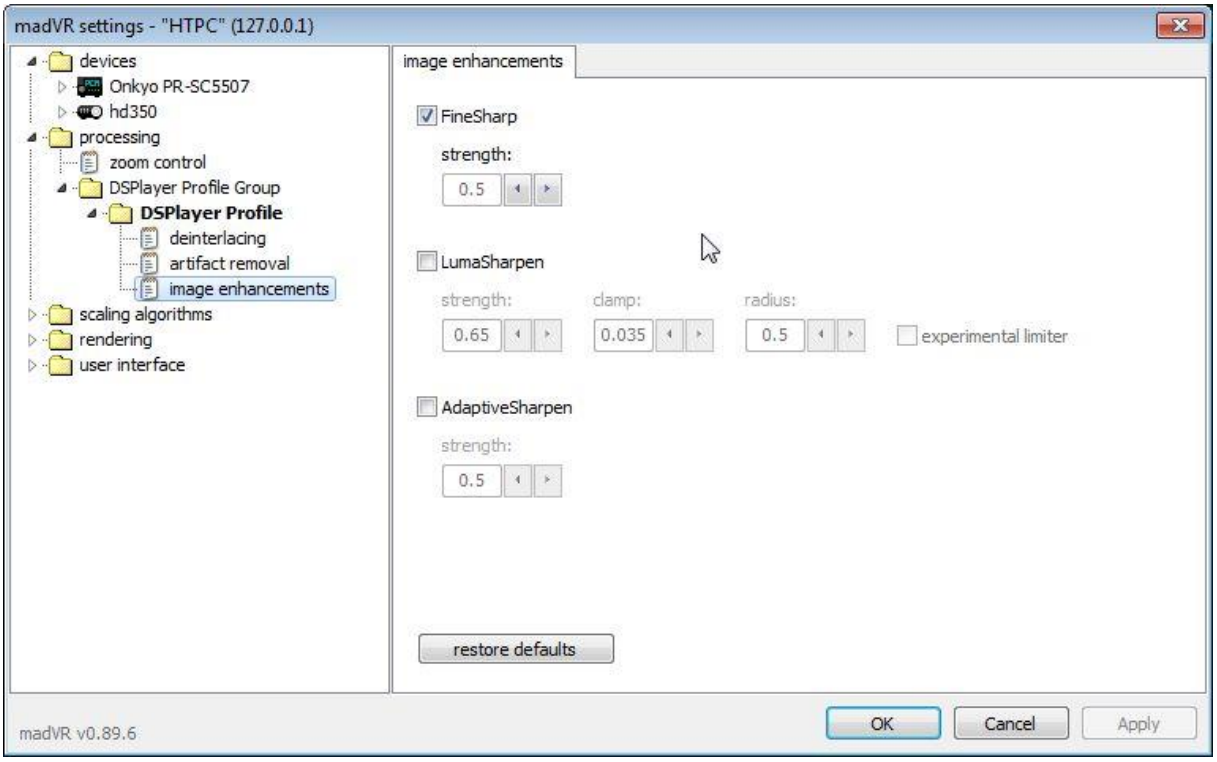
processing
scaling algorithms
rendering
general settings
windowed mode settings
exclusive mode settings
trade quality for performance
DSPlayer Profile Group
DSPlayer Profile
smooth motion
dithering
user interface
calibration
disable calibration controls for this display
this display is already calibrated
calibrate this display by using yCMS
calibrate this display by using external 3DLUT files
disable GPU gamma ramps
madVR v0.89.6
OK
Cancel
Apply



Vul in de display mode alleen 1080p60 in!




madVR settings - "HTPC" (127.0.0.1)
devices
Onkyo PR-SC5507
hd350
processing
zoom control
DSPlayer Profile Group
DSPlayer Profile
deinterlacing
artifact removal
image enhancements
scaling algorithms
rendering
user interface
artifact removal
reduce banding artifacts
default debanding strength:
low
medium
high
strength during fade in/out:
low
medium
high
madVR v0.89.6
OK
Cancel
Apply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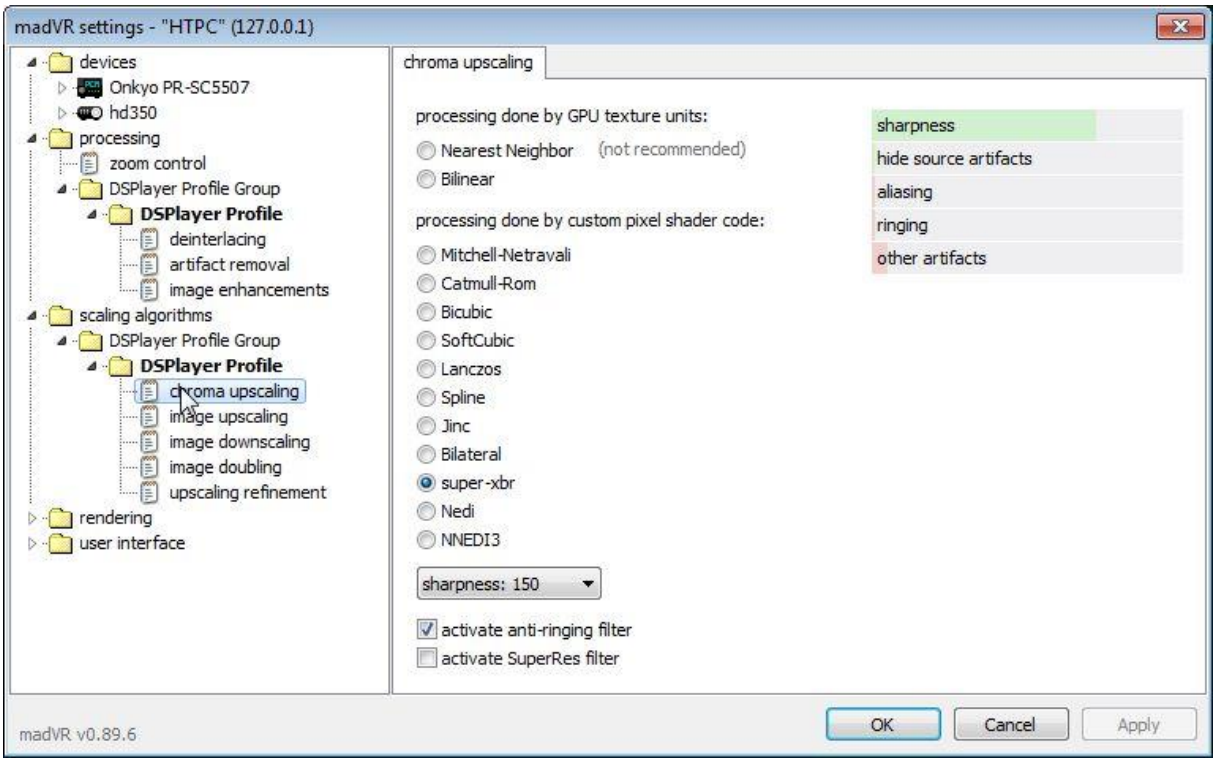
hd350
processing
zoom control
DSPlayer Profile Group
DSPlayer Profile
deinterlacing
artifact removal
image enhancements
scaling algorithms
rendering
user interface
image enhancements
FineSharp
strength:
0.5
LumaSharpen
strength:
clamp:
radius:
0.65
0.035
0.5
experimental limiter
AdaptiveSharpen
strength:
0.5
restore defaults
madVR v0.89.6
OK
Cancel
Apply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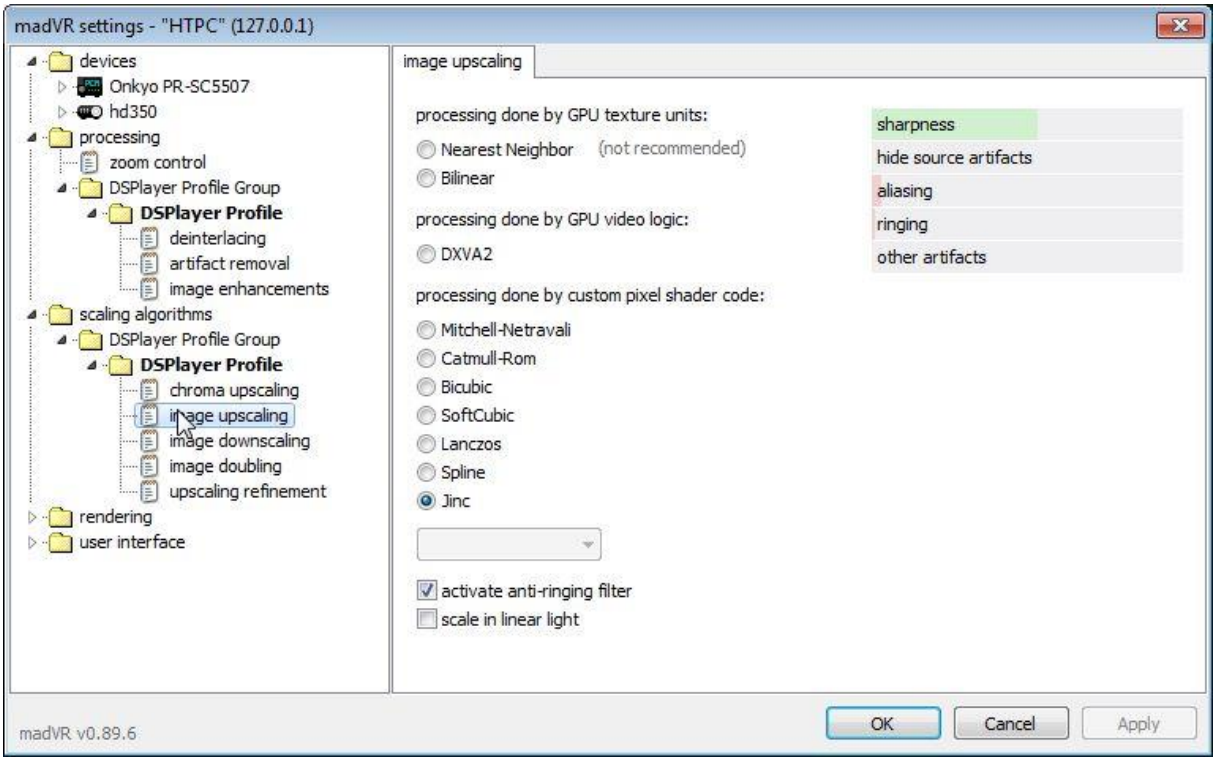
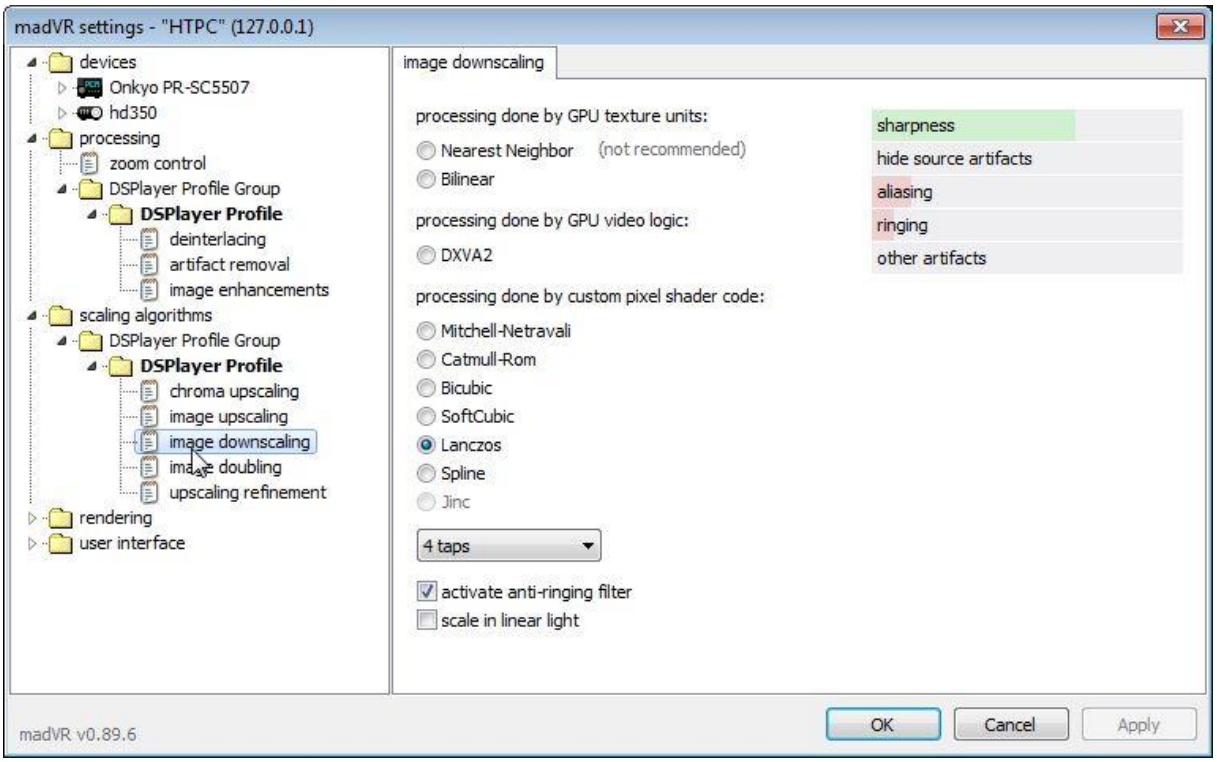
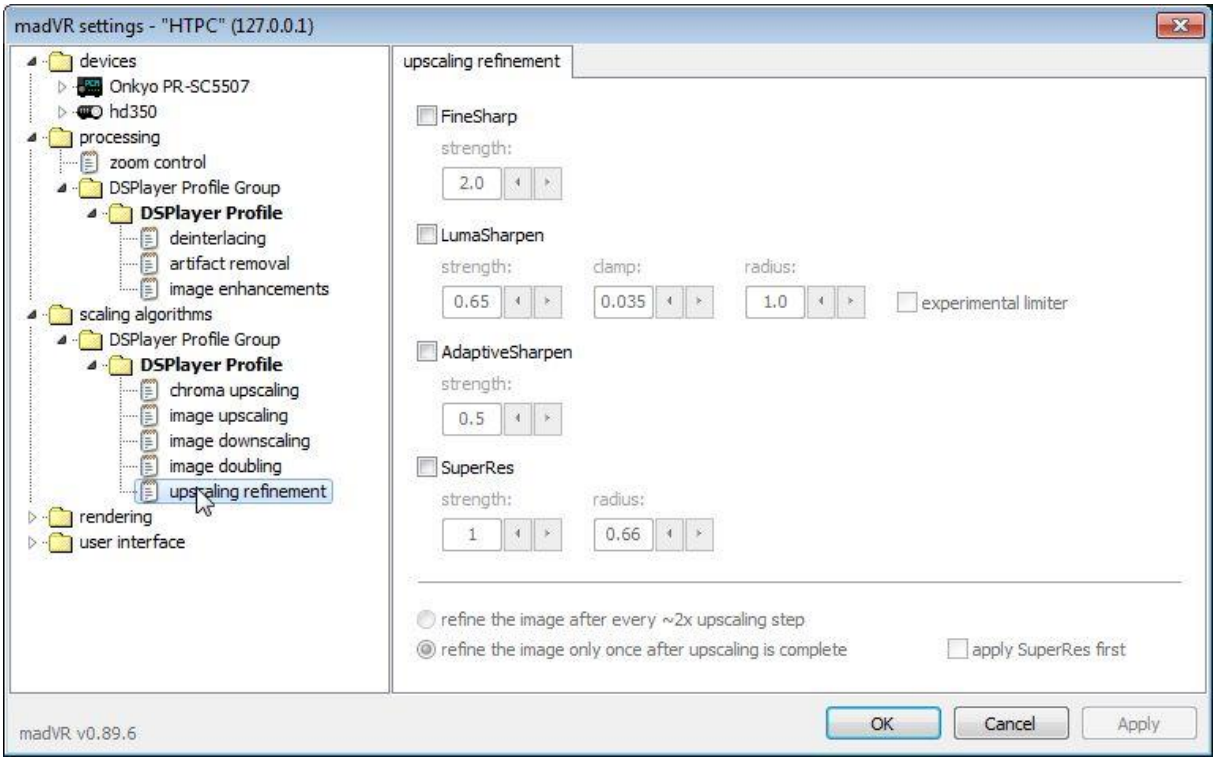
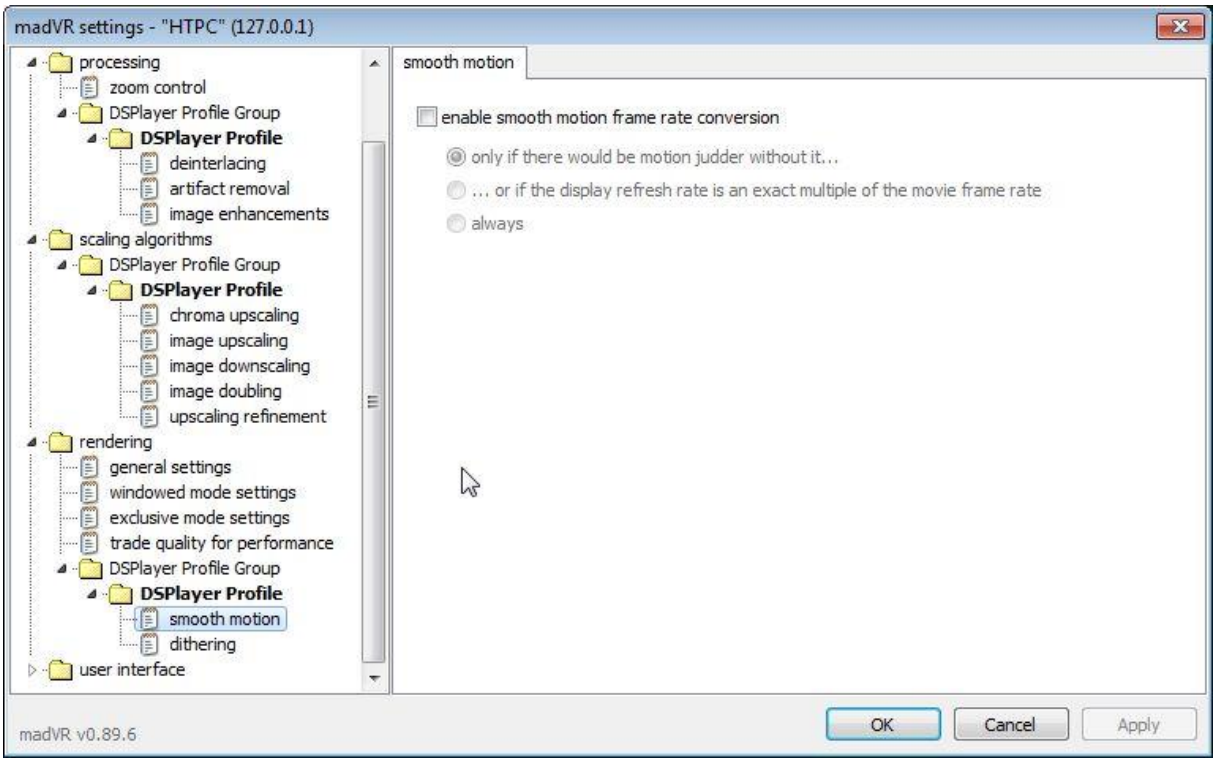
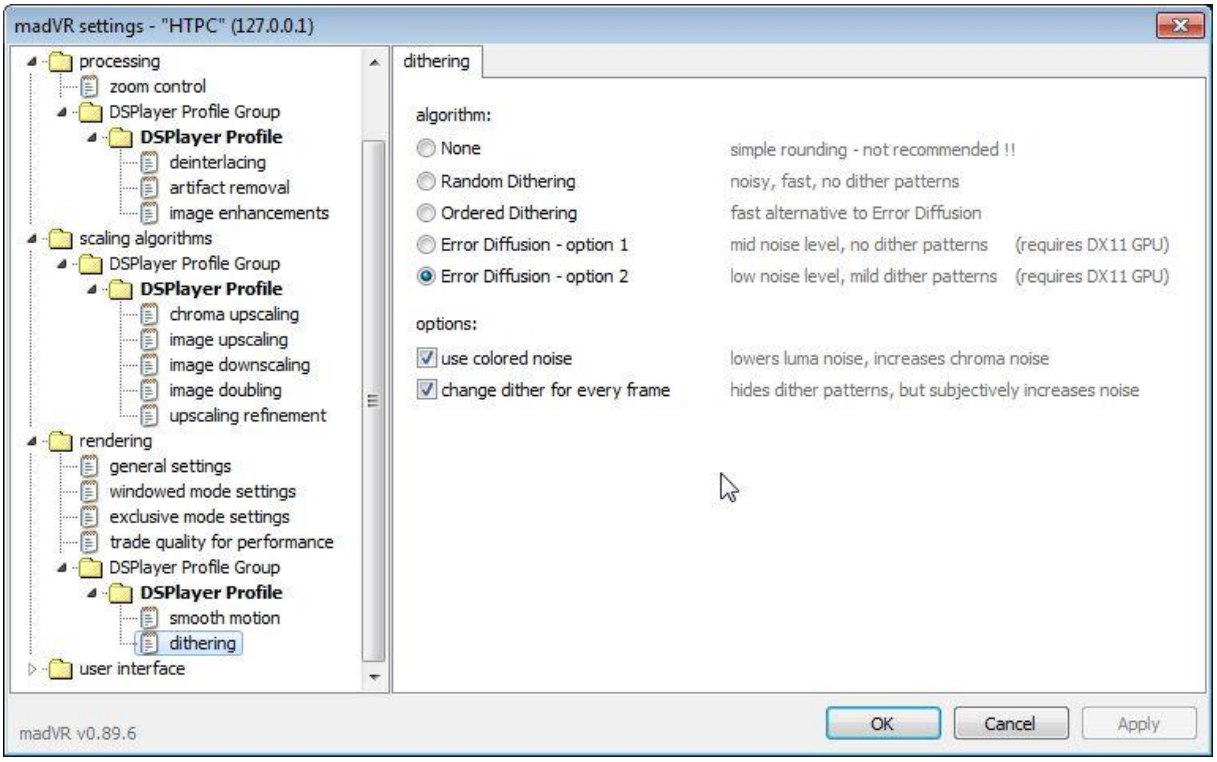
DSPlayer Profile
deinterlacing
artifact removal
image enhancements
scaling algorithms
DSPlayer Profile Group
DSPlayer Profile
chroma upscaling
image upscaling
image downscaling
image doubling
upscaling refinement
rendering
user interface
chroma upscaling
processing done by GPU texture units:
Nearest Neighbor (not recommended)
Bilinear
processing done by custom pixel shader code:
Mitchell-Netravali
Catmull-Rom
Bicubic
SoftCubic
Lanczos
Spline
Jinc
Bilateral
super-xbr
Nedi
NNEDI3
sharpness: 150
activate anti-ringing filter
activate SuperRes filter
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.89.6
OK
Cancel
Apply


madVR settings - "HTPC" (127.0.0.1)
devices
Onkyo PR-SC5507
hd350
processing
zoom control
DSPlayer Profile Group
DSPlayer Profile
deinterlacing
artifact removal
image enhancements
scaling algorithms
DSPlayer Profile Group
DSPlayer Profile
chroma upscaling
image upscaling
image downscaling
image doubling
upscaling refinement
rendering
user interface
image upscaling
processing done by GPU texture units:
Nearest Neighbor (not recommended)
Bilinear
processing done by GPU video logic:
DXVA2
processing done by custom pixel shader code:
Mitchell-Netravali
Catmull-Rom
Bicubic
SoftCubic
Lanczos
Spline
Jinc
activate anti-ringing filter
scale in linear light
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.89.6
OK
Cancel
Apply


madVR settings - "HTPC" (127.0.0.1)
devices
Onkyo PR-SC5507
hd350
processing
zoom control
DSPlayer Profile Group
DSPlayer Profile
deinterlacing
artifact removal
image enhancements
scaling algorithms
DSPlayer Profile Group
DSPlayer Profile
chroma upscaling
image upscaling
image downscaling
image doubling
upscaling refinement
rendering
user interface
image downscaling
processing done by GPU texture units:
Nearest Neighbor (not recommended)
Bilinear
processing done by GPU video logic:
DXVA2
processing done by custom pixel shader code:
Mitchell-Netravali
Catmull-Rom
Bicubic
SoftCubic
Lanczos
Spline
Jinc
4 taps
activate anti-ringing filter
scale in linear light
sharpness
hide source artifacts
aliasing
ringing
other artifacts
madVR v0.89.6
OK
Cancel
Apply


madVR settings - "HTPC" (127.0.0.1)
devices
Onkyo PR-SC5507
hd350
processing
zoom control
DSPlayer Profile Group
DSPlayer Profile
deinterlacing
artifact removal
image enhancements
scaling algorithms
DSPlayer Profile Group
DSPlayer Profile
chroma upscaling
image upscaling
image downscaling
image doubling
upscaling refinement
rendering
user interface
upscaling refinement
FineSharp
strength:
2.0
LumaSharpen
strength:
clamp:
radius:
0.65
0.035
1.0
experimental limiter
AdaptiveSharpen
strength:
0.5
SuperRes
strength:
radius:
1
0.66
refine the image after every ~2x upscaling step
refine the image only once after upscaling is complete
apply SuperRes first
madVR v0.89.6
OK
Cancel
Apply


madVR settings - "HTPC" (127.0.0.1)
processing
zoom control
DSPlayer Profile Group
DSPlayer Profile
deinterlacing
artifact removal
image enhancements
scaling algorithms
DSPlayer Profile Group
DSPlayer Profile
chroma upscaling
image upscaling
image downscaling
image doubling
upscaling refinement
rendering
general settings
windowed mode settings
exclusive mode settings
trade quality for performance
DSPlayer Profile Group
DSPlayer Profile
smooth motion
dithering
user interface
smooth motion
enable smooth motion frame rate conversion
only if there would be motion judder without it...
... or if the display refresh rate is an exact multiple of the movie frame rate
always
madVR v0.89.6
OK
Cancel
Apply


madVR settings - "HTPC" (127.0.0.1)
processing
zoom control
DSPlayer Profile Group
DSPlayer Profile
deinterlacing
artifact removal
image enhancements
scaling algorithms
DSPlayer Profile Group
DSPlayer Profile
chroma upscaling
image upscaling
image downscaling
image doubling
upscaling refinement
rendering
general settings
windowed mode settings
exclusive mode settings
trade quality for performance
DSPlayer Profile Group
DSPlayer Profile
smooth motion
dithering
user interface
dithering
algorithm:
None
simple rounding - not recommended !!
Random Dithering
noisy, fast, no dither patterns
Ordered Dithering
fast alternative to Error Diffusion
Error Diffusion - option 1
mid noise level, no dither patterns
(requires DX11 GPU)
Error Diffusion - option 2
low noise level, mild dither patterns
(requires DX11 GPU)
options:
use colored noise
lowers luma noise, increases chroma noise
change dither for every frame
hides dither patterns, but subjectively increases noise
madVR v0.89.6
OK
Cancel
Apply

4.3 Netwerk buffer instellingen

Om buffer issues te voorkomen kunnen preventief de netwerk buffer instellingen van Kodi gewijzigd worden. Om dit te doen, creëer de file advancedsettings.xml in de kodi users directory met de volgende inhoud:

```
<advancedsettings>
<network>
<buffermode> 1 </buffermode>
<readbufferfactor> 4 </readbufferfactor>
<cachemembuffersize> 104857600 </cachemembuffersize>
</network>
</advancedsettings>
```

4.3.1 Buffermode – The "what"

The first Kodi cache setting we're going to look at is the Buffermode. Buffermode controls how Kodi uses the cache during playback. More specifically, it controls which files get buffered. This is the "what files" will get buffered.

It can have four settings:

SETTING	EXPLANATION
0	This is the default value. This buffers all internet filesystems (http, ftp, webdav, etc.)
1	This buffers all filesystems, both Internet and Local
2	Only buffers true Internet file systems (http, etc.)
3	No buffer

4.3.2 Readbufferfactor – The "speed"

Readbufferfactor is the setting that controls how quickly Kodi will fill the cache. By default, it is set to "1", which means that Kodi will only look ahead slightly to store what's coming next. Think of this setting as the "speed" in which Kodi fills the buffer.

If your network is unreliable, slow or you have a fair amount of interference in your home, you'll want to increase this value.

The setting value is a multiplier of the default limit. Kodi looks at the average speed that the video will play at. Higher resolution\bitrate videos will stream at a higher speed.

The default setting is usually pretty good. I recommend only a slight increase to 1.5.

If you make the other changes and still have issues, you can change this value to as high as 4. If you have a high amount of RAM in your device, you could go even higher than that.

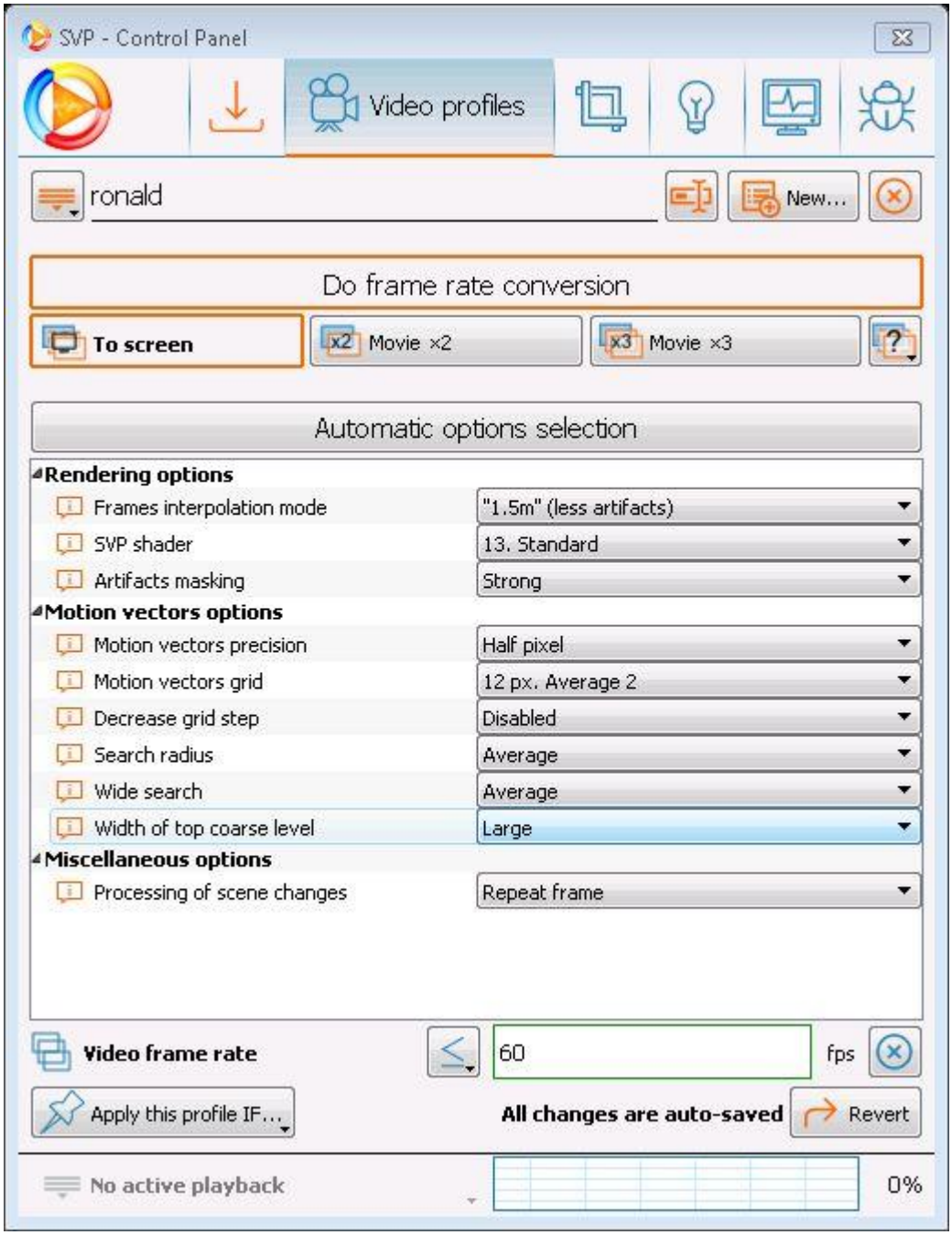
Basically, you can increase this value as much as you want. Kodi won't crash, but it may end up using all of the bandwidth you have in the device. At that point, you won't see any improvement in increasing the number. You'll also not be able to do *anything* else on your device while you're watching a video.

5. Smooth Video Project

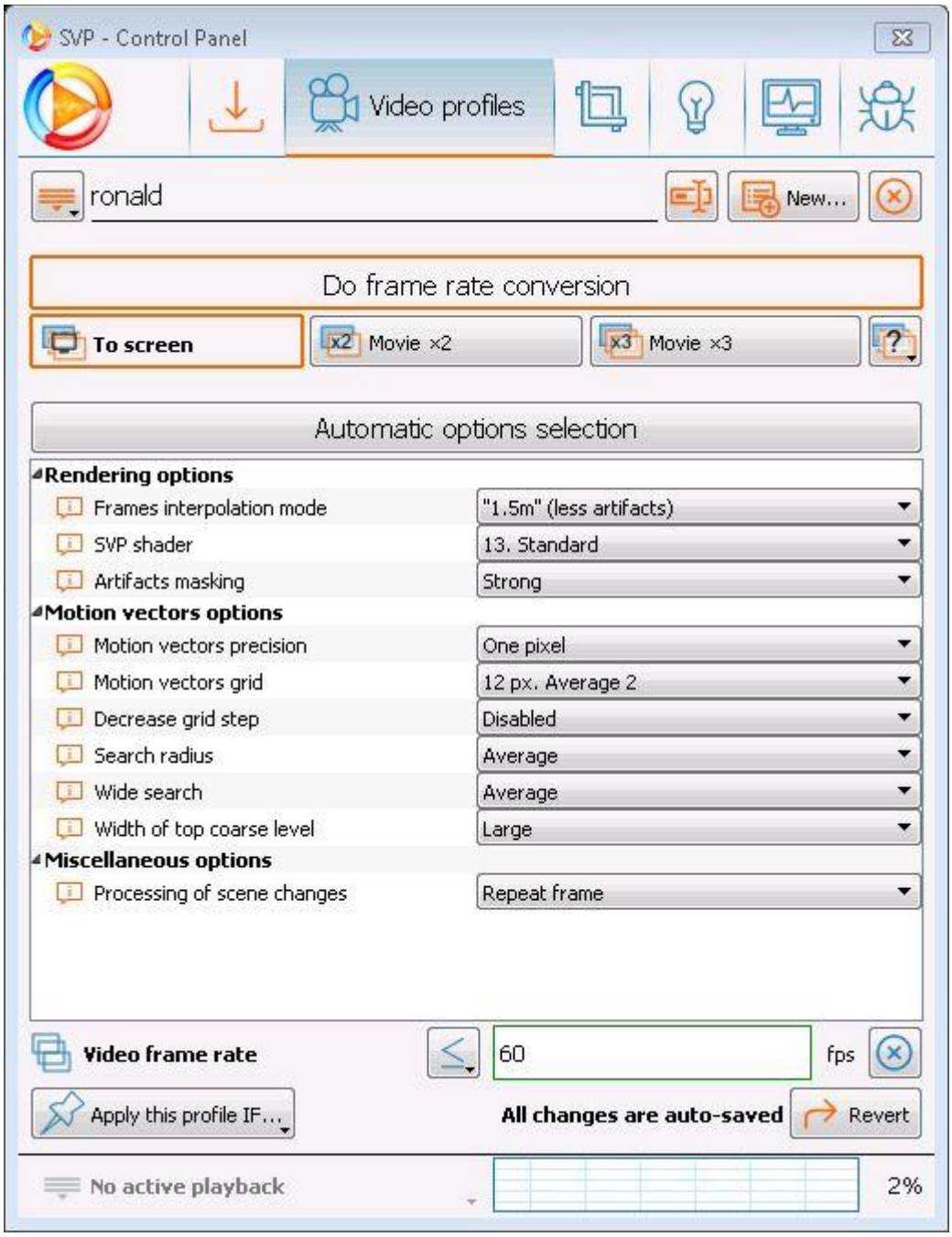
5.1 My settings

Ik gebruik dus 1.5m SVP profiel, dat vind ik persoonlijk het beste resultaat vind geven (2m mode geeft voor mij teveel halo achtige artifacts en 1m mode is niet erg smooth. 1.5m mode biedt voor mij een bruikbaar compromis tussen smoothness en artifacts).

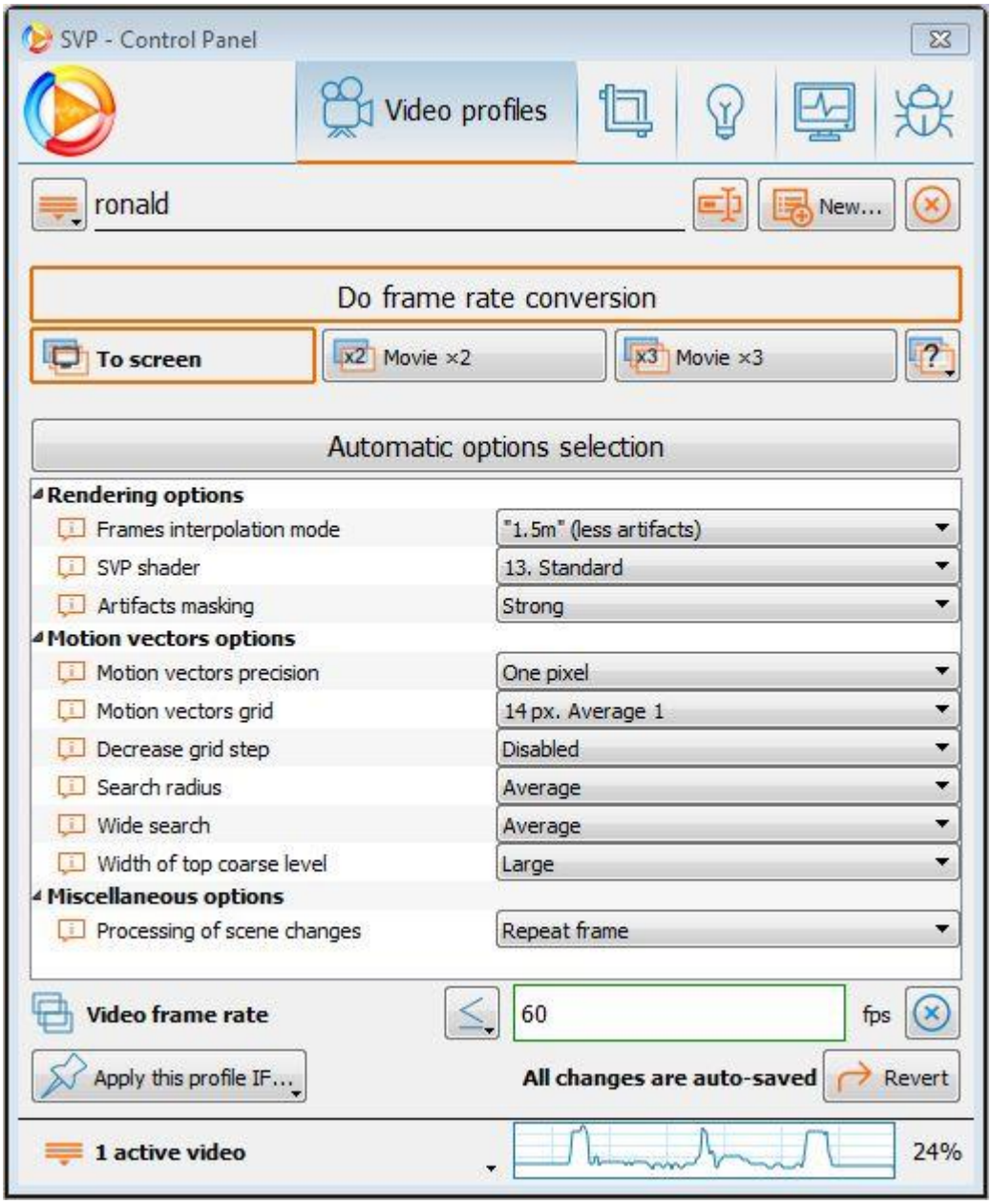
SVP4 baseert zijn automatic settings op het draaien van een performance assessment. Maak daarna een nieuw profile aan welke op zijn beurt weer een kopie is van de automatic settings. In mijn setup met AMD 8350 4GHz acht core cpu levert dit de volgende standaard settings op voor 1.5m profiel:



Echter met deze settings bereikt de cpu load af en toe 100% waardoor er stotteringen in het beeld ontstaan. De eerste setting om terug te tunen is Motions Vector Precision (zie uitleg onder).



Dit blijkt nog niet genoeg te zijn, de tweede setting om terug te tunen is Motions Vector grid (zie wederom uitleg onder), hetgeen resulteert in de volgende settings:



Met deze settings heb ik een gemiddelde load van onder de 30% , waarbij de uitschieters onder de 90% blijven en ik een af en toe haperend beeld voorkom. Hiermee krijg ik een redelijk smooth beeld waarbij er helaas voor mijn smaak nog teveel artifacts in het beeld voorkomen.

In SVP 3 gebruikte ik deze settings:

Hiermee kreeg ik een redelijk artifact vrij beeld wat helaas wel weer wat aan smoothness te wensen over liet.

Note:
Ik ben nog steeds aan het finetunen van de SVP settings om tot een voor mij werkbaar en acceptabel compromis te komen tussen smoothness en artifacts.

5.2 Finetuning settings

Basically leave the settings at their default except for the following 4 settings if you need more performance (start with the first setting and then only go to the next one if you need still need even more performance (= less cpu load)):

- Motion vectors precision
- Motion vectors grid
- SVP Shader
- SVP interpolation mode

For example, "Motion vectors precision" has a large impact on the CPU but minimal impact on smoothness.

The only exception is that you may want to manually set the SVP shader to "Sharp (anime)" for traditional non-CGI animated content.

Conversely, if you want to increase smoothness, simply increase the values for those 4 same settings, but in the exact opposite order.

You may want to mix and match a bit though since some of the options at higher settings (like shader set to "Complicated" or vectors grid set to "8px") can give quite a few artifacts depending on the video ("Complicated" is bad for lower resolutions, thin lines, and sometimes lower framerates; "8px" becomes progressively worse at higher the video resolutions).

5.3 Uit het Smooth Video Project forum

- It is important to understand that for any parameters the balance between video smoothness and quality / noticeable artifacts FRC is kept. So high smoothness always leads to stronger artifacts and artifacts reduction always reduces smoothness.There is no perfect set of parameters which gives the maximum smoothness without artifacts.
- Hoe het aantal threads te checken: Information -> Additional info -> Last generated script, check the number in "global threads = XXX" line
- Video niet smooth:
    - You may want to replace avisynth.dll with the one from SVP 3 - 2.5.8 "special SVP edition". Just place it near the video player's executable...
    - My player folder already have an avisynth.dll seating there, replace it didn't change anything. So, i'm doing it the opposite way, delete the avisynth.dll from that folder. You guess what, the auto thread number generated is still remain 14, but the video is smooth now..
- To reduce artifacts you need to remove black borders from your video. You can do it with SVP autocrop option or manually.
- Mogelijk worden niet alle cores gebruikt door SVP, het aantal threads dat gebruikt wordt is instelbaar. Uitgangspunt: threads = cores -1 (voor AMD! Voor Intel CPU's met hyperthreading is dit cores x2-1)
- Checken of de weergever naast 60 Hz ook 72 Hz ondersteund, zoja dan zal dat theoretisch een beter resultaat geven met 72Hz dan 60 Hz, omdat 72 Hz een exacte veelvoud is van 24 Hz.
- Er lijkt consencus te zijn op SVP forum dat 12px de beste compromis setting is tussen smoothness en artifacts voor Motions Vector Grid setting.
- SVP heeft een Demo mode, deze blijkt bedoeld te zijn om de smoothness te kunnen beoordelen.

5.4 Basic options

The "basic" interface contains only the necessary parameters, which can not significantly damage the result.

Frames interpolation mode

- **Off** - disables the FRC for current profile. Can be useful for creating special profiles for video format UHD 4K, or hardware backlight SVPlight

- **Uniform** - the most "honest" mode in which the maximum smoothness for the specified target frame rate is achieved. The number of frames of the original video, in the output is minimal that gives the most visibility of artifacts.

The following options retain all the original frames, and differ in the amount and uniformity of interpolated frames:

- **2m** (every original frame twice) - the largest number of repeats the original frame, minimal smoothness
- **1m** (every original frame once) - each original frame is repeated once
- **1.5m** (like 1m but with different intermediate frames times)

More details about "-m" modes can be read in Technical details section.

- **Adaptive** - automatically switches modes on the basis of the analysis of the resulting quality of FRC for a given scene

SVP shader

Specifies an algorithm for constructing an intermediate frame of a pair of source and found motion vectors. It does not make sense to describe the algorithms in the **manual**, but interested individuals can refer to SVPflow plugins.

- **1. Fastest** - the fastest :) and sharpest (does not mix objects)
- **2. Sharp** - does not mix objects, less artifacts than with 1st shader, recommended for hand-drawn animation.
- **11. Simple Lite** - most simple mixing of compensated frame in motion
- **11b. By blocks** - same as 11, but in block mode, much faster with disabled GPU-acceleration, but gives noticeable square artifacts
- **13. Standard** - variation of 11th shader, giving more visible artifacts but more "soaping" effect
- **21. Simple** - 11th shader, supplemented with masking
- **23. Complicated** - 21st shader with more complex masking

Target frame rate

Selection of target frame rate.

Important: For smooth video playback, without jerks and fading, video frame rate should be close to the vertical frequency of the monitor.

The basic parameters offer two options:

- **Double source frame rate** (2x) - simple doubling of the frame rate of the original video gives the fewest FRC artifacts, but there may be jerks because of the video frame rate not fitting with a vertical refresh rate of the monitor.

- **To screen refresh rate** - smoothing up to the vertical refresh rate of the monitor detected by the **Manager**, or set manually by menu item **Screen selection -> Force...**.

Decrease frame size

- **Disabled**
- **To screen size**

The speed of the FRC algorithm depends on the size of a video frame.

Therefore, when a video is playing more than the size of the monitor one from the two options:

1. Video -> FRC -> decrease the screen
2. Video -> reduction of the screen -> FRC -> output point-to-point

the second should be chosen.

If there is insufficient capacity of the system (especially CPU) it is possible as **last resort** to reduce the whoe video before FRC, reducing the resolution and video definition:

- **To 50% of original size**
- **To 75% of original size**

Important: using this parameter changes the frame size that can be handled incorrectly by some video players.

5.5 Advanced options

Target frame rate

In addition to the basic parameters there are the following values with **fixed** frame rate increasing factors:

- **25->60 (2.4x)**
- **24->60 (2.5x)**
- **Source multiplied by 3**

Attention: the output frame rate **higher** then the vertical frame rate of the monitor will lead to jerks and fading of the video

We recommend to us always the **To screen refresh rate** mode (from the basic parameters).

Motion vectors grid

Selected FRC algorithm searches for motion in the frame on small image blocks. The smaller block size is, the:

- More accurate is the determination of local movements
- Significantly higher are the CPU requirements
- More noticeable wavy artifacts

Blocks can overlap each other by a quarter or a half unit. Overlapping increases requirements for CPU, but always increases quality.

All together, this gives nine versions of grid stepping vectors (three sizes for three overlap variants):

- **Large 1/2/3**
- **Average 1/2/3**
- **Small 1/2/3**

Important: small block size is not always the best in terms of the final result, even if the capacity of the system allows you to set a block size. We recommend to set **Average** block size with average overlapping.

More to the topic of the block size can be found in MVTools description.

Motion vectors precision

The higher the accuracy, the higher the smoothness of slow movements but CPU and RAM requirements are also higher, especially without GPU-acceleration.

- **Two pixels**
- **One pixel**
- **Half pixel**

It is important to understand that any smoothness has a limit, and if for DVD the difference between FRC modes may be noticeable immediately, for FullHD the difference is clearly visible only in rare cases which are especially selected, then for video format 4K may not be any difference at all.

Artifacts masking

Masking "bad" areas of the frame (i.e. areas in which the motion is determined with large errors, and where will be more visible artifacts) parts of the original frame.

Weak masking usually gives good results, but it can lead to new types of artifacts, such as tripling of thin objects. Strong masking further significantly reduces the overall visual smoothness of the video.

- **Disabled**
- **Weakest** ... **Average** ... **Strongest**

Processing of scene changes

Behavior on "change of scene", when one frame shows one scene in a movie, and the following frame switches to another.

A good example - an ordinary dialogue, the camera alternates between the two people. At scene change it is senseless to search movement since there is none. Moreover, an attempt to find such a motion, and build intermediate frames causes artifacts as large as the size of the entire frame. Therefore SVP specifically looks for moments of change of scene and processes them in a special way.

- **Blend adjacent frames** - smooth transition from one scene to another by mixing (reconstitution) frames between each other
- **Repeat frame** - repeat the original frame, the scene changes instantly

Decrease frame size

Additional to basic parameters it is possible to decrease the frame size **to [specified] width/height**.

5.6 Expert options

The influence of these parameters on the results has not been understood by ourselves :)

Secret knowledge seekers can start by exploring help of MVTools, continue reading on Doom9 forums, and also take part in our forum.

Target frame rate

In addition to the advanced settings the following values are available:

- **To screen refresh rate /3**
- **To screen refresh rate /2**

Decrease grid step

- **Disabled**
- **To small step 6-8 px.**
- **To smallest step 3-4 px.**
- **By two with local refinement**
- **By two with global refinement**

When reducing the grid, the FRC algorithm tries to clarify the motion vector with smallest block size. Unfortunately, there are no people in this world that know for 100% how the verification procedure will affect a particular video, hence we drop the details in this **Article**.

Search radius

Limits the maximum length of motion vectors. Large radius is not always better than small, because the found "far" motion vector may be incorrect, resulting in more artifacts. The larger the search radius the higher is the demand on CPU.

Also, this setting specifies the method for comparing image blocks together, all options except **Small and fast** are using the SADT function instead of SAD.

- **Small and fast**
- **Small / Average / Large**

Wide search

What to do if a good enough motion vector couldn't be found at a given search radius.

- **Disabled**
- **Average / Strong / Strongest**

6. RGB video levels

Mijn grootste issue was dat de RGB video levels niet klopten en een washed out beeld gaven. Op verschillende plekken in de keten dient een keuze gemaakt te worden tussen 16-235 of 0-255. Ik had in eerste instantie alles (kodi output settings, kodi internal filter video decoder, madvr, grafische kaart, projector. Ik had alles op 16-235 staan en het beeld bleef washed out. Na alle settings een voor een getoggeld te hebben bleek dat als ik alles op 16-235 zet behalve madvr (0-255) dan kloppen de RGB video levels weer en ziet het er weer goed uit (gepauzeerde scene ook steeds vergeleken met het beeld, zelfde scene uiteraard, van de dune).

Merk op dat de gewenste configuratie precies andersom is (zie optie 3 hieronder), echter dit werkt in mijn setup dus niet.

(1) Display wants 0-255. GPU and madVR are consequently also both set to 0-255.
This is the most recommended setup because it doesn't (shouldn't) have any banding problems, and still has all video, desktop and games with correct black/white levels. In this case test patterns need to have black at 0,0,0, obviously.

(2) Display wants 16-235. GPU is set to 16-235. madVR has to be set to 0-255.
This is not recommended, because the GPU stretches the madVR output, probably in 8bit without dithering, so banding could be introduced. However, this is not a big problem for ArgyllCMS. Argyll still needs to create test patterns with black at 0,0,0. The GPU will then stretch the test patterns from 0-255 to 16-235, so the display will get 16,16,16, although Argyll rendered 0,0,0. So the levels are correct.

(3) Display wants 16-235. GPU is set to 0-255. madVR is set to 16-235.
This is the recommended setup for best image quality if your display can't do 0-255. This setup results in banding-free madVR image quality. However, levels for desktop and games will be incorrect, because desktop and games will render black at 0,0,0, while the display expects black at 16,16,16. This is a problem for ArgyllCMS, because Argyll will create test patterns with black at 0,0,0, and the display will also receive these at 0,0,0. So basically Argyll test patterns will have wrong levels, which will screw up the whole calibration.

Proper RGB output levels are necessary when passing from PC to TV color spaces. When sending video via HDMI to a TV, in most cases, color spaces are set as follows (Note: LAV Video RGB settings do not apply):

(madVR) ***PC levels (0-255)*** -> **(GPU)** ***Limited Range RGB 16-235*** -> **(TV)** ***Output as RGB 16-235***

madVR expands the source 16-235 signal to full range RGB leaving the conversion back to 16-235 to the graphics card.

If your HTPC is a dedicated Kodi machine, an alternative approach is possible.

Alternative Color Space Configuration:

(madVR) ***TV levels (16-235)*** -> **(Kodi)** ***Use limited color range (16-235)*** -> **(GPU)** ***Full Range RGB 0-255*** -> **(TV)** ***Output as RGB 16-235***

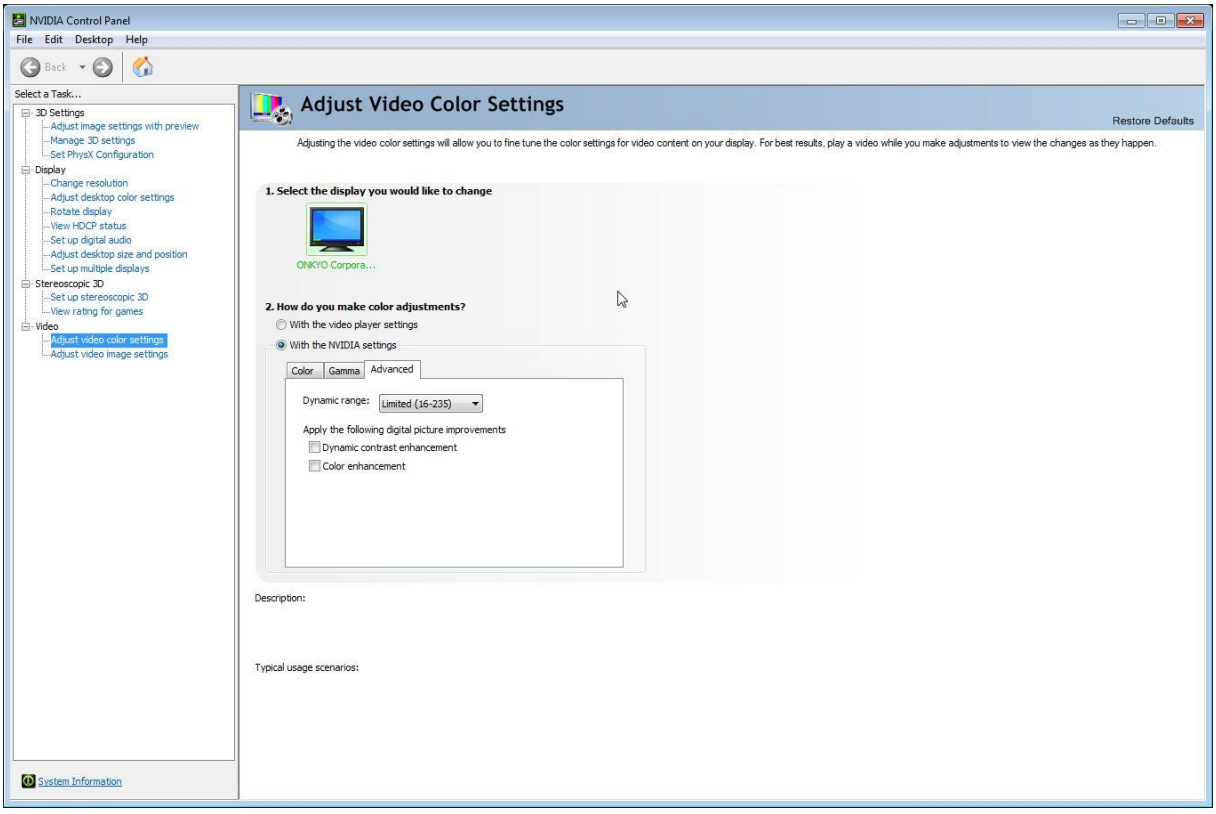
In this configuration, the signal remains 16-235 until it reaches the TV avoiding any clipping by the GPU. This is the most pure path with the fewest color range conversions and least amount of added dithering. However, other computer applications will appear over-saturated as a result unless they are also configured to use 16-235 levels. Note: Kodi must be configured under *System* -> *Video output* to use a limited color range to match madVR.

A final option involves setting your TV to output RGB 0-255 and leaving all settings at full range. madVR expands the source to 0-255 and displays it full range on your television. The TV must first be calibrated while set to full range RGB. The result can vary depending on how well your TV displays whiter-than-white and blacker-than-black values.

PC Color Space Configuration:

(madVR) ***PC levels (0-255)*** -> **(GPU)** ***Full Range RGB 0-255*** -> **(TV)** ***Output as RGB 0-255***

More information on TV vs PC color spaces here.

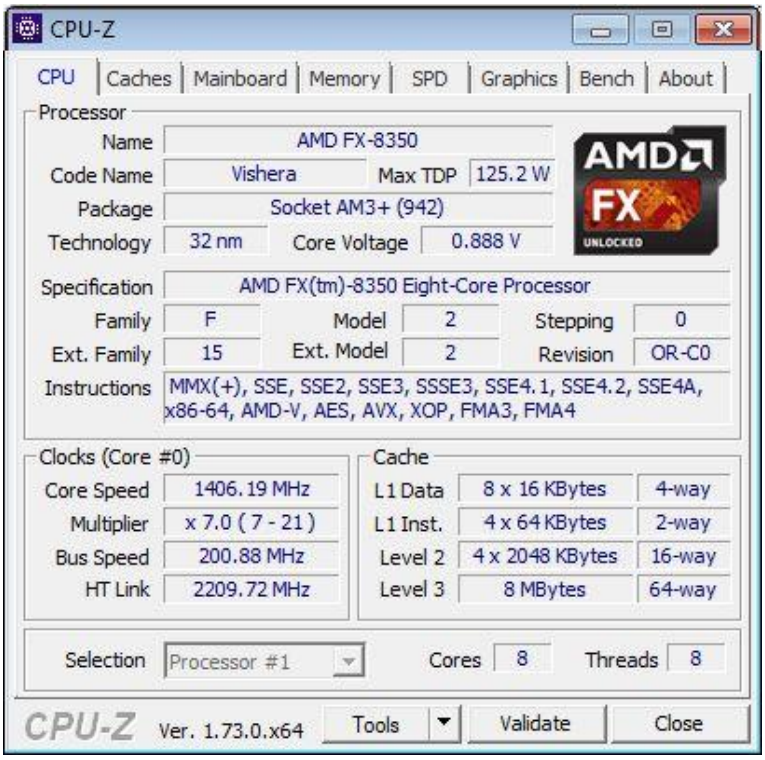


Settings - Videos
8:26 AM
Videos - Settings
Video decoder
Enable system tray icon
Hardware decoder to use
DXVA2 (copy-back)
Thread for multi-threading
Auto
Use stream aspect ratio
Field Order
Auto
Deinterlacing Mode
Auto
RGB output levels (for YUV -> RGB conversion)
TV (16/235)
Dithering mode
Ordered Dithering
Software deinterlacing (YADIF)
- output mode
50p/60p (Video)

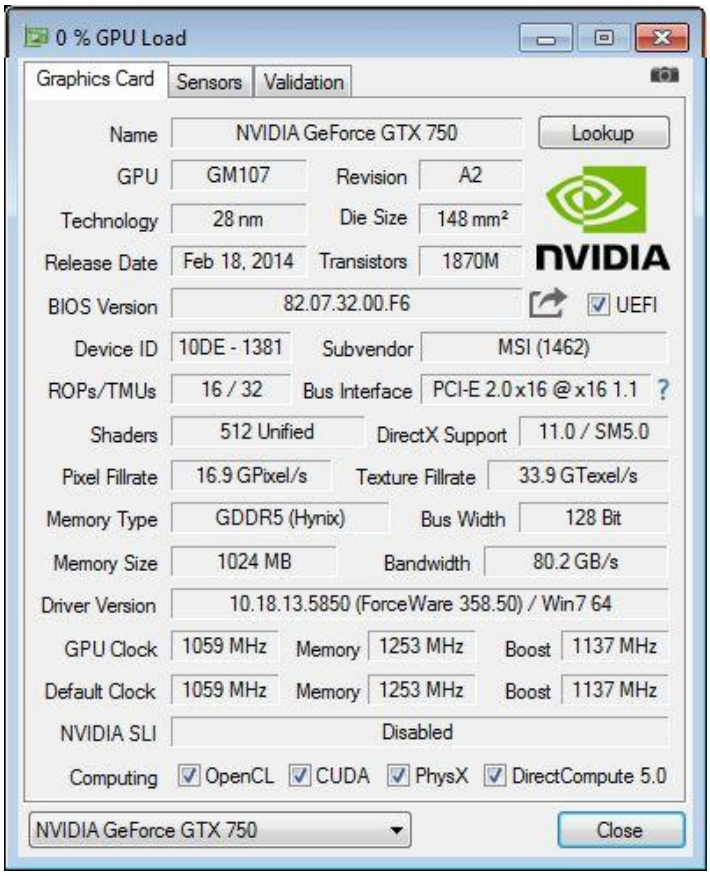
Settings - System
8:27 AM
Confluence
System - Settings
Video output
Audio output
Input devices
Internet access
Power saving
Debugging
Master lock
Settings level
Expert
Display mode
Full screen #1
- Resolution
1920x1080p
- Use fullscreen window
- Blank other displays
Stereoscopic 3D mode / Current
Disabled
- Preferred mode
Same as movie
Vertical blank sync
Always enabled
Video calibration...
Test patterns...
Use limited colour range (16-235)
Reset above settings to default
Use limited colour range (16-235) instead of full colour range (0-255). Limited range should be used if your display is a regular HDMI TV and doesn't have a PC or other mode to display full range colour, however if your display is a PC monitor then leave this disabled to get proper blacks.

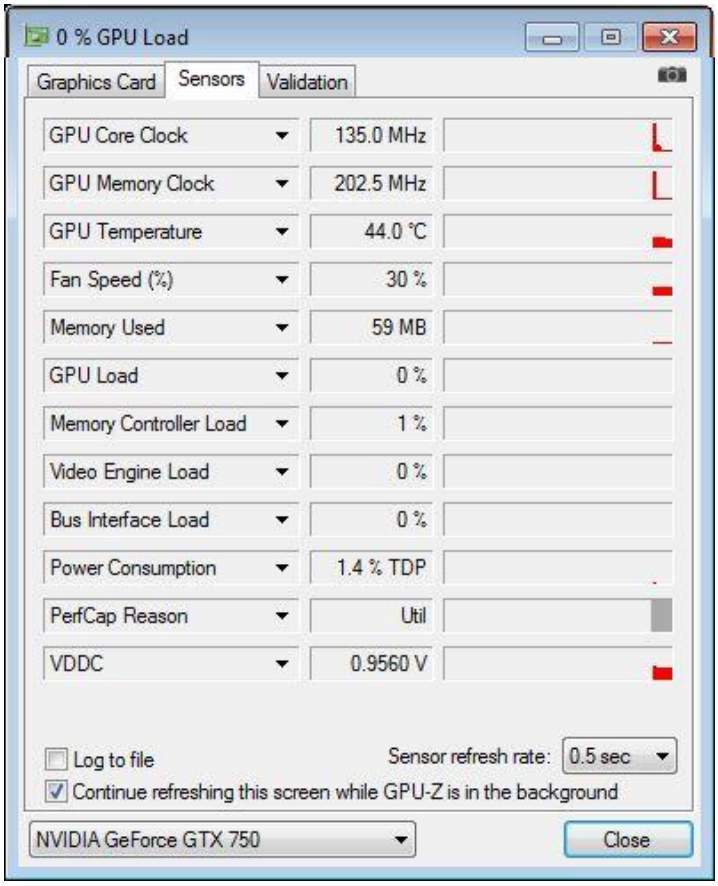
7. Performance tests

- Tijdens het afspelen van een film kan met de “O” toets de gebruikte filters en de CPU performance op het scherm gedisplayed worden.
- Tijdens het afspelen van een film krijg je met CTRL+J gegevens te zien van MadVR, met CTRL+R reset je de counters van dropped frames. Let op of er tijdens het spelen veel frames gedropped worden.
- In SVP manager kan de performance monitor aangezet worden, dit kan tijdens of voor het afspelen van een film.
- Tijdens het afspelen van een film krijg je met CTRL+WIN+T de tearing test te zien, een oranje verticale lijn door het beeld die in het horizontale vlak heen en weer beweegt. Dit dient smooth te gaan zonder haperingen.
- Met de tool CPU-Z kun je alle settings van je CPU bekijken Te downloaden op http://www.cpuid.com/softwares/cpu-z.html



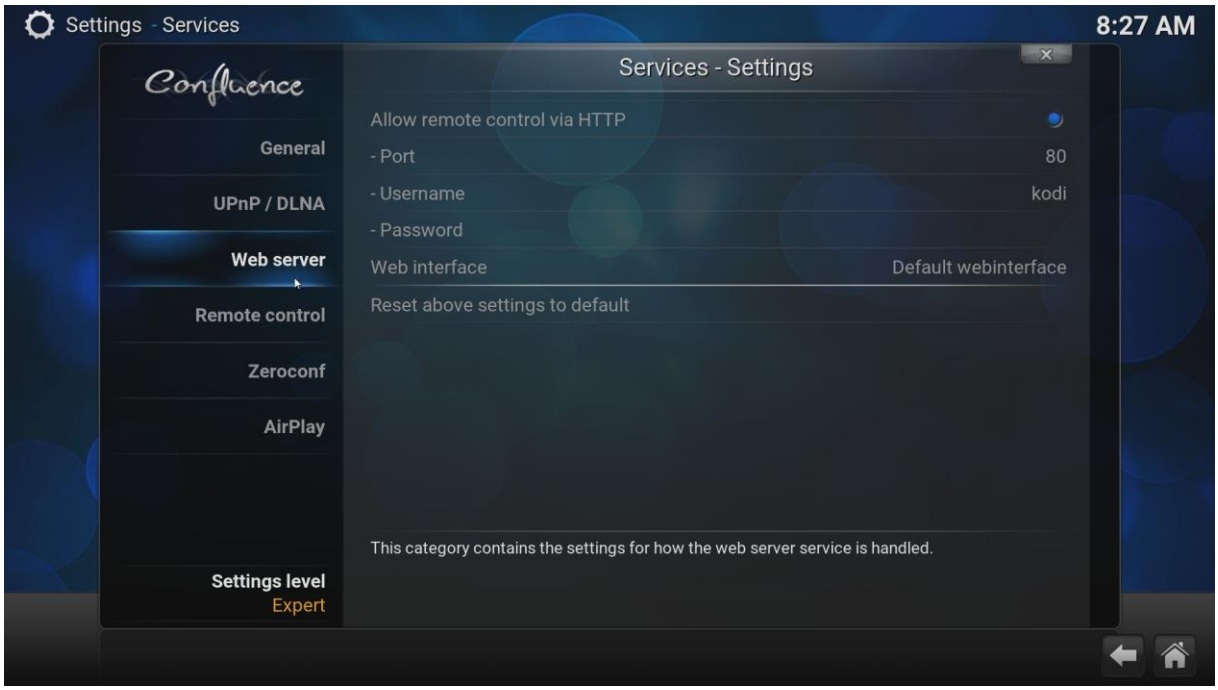
- Bekijk of de GPU belasting van de videokaart geen bottleneck vormt, dit kan met de tool GPU-Z. Te downloaden op https://www.techpowerup.com/gpuz/


0 % GPU Load
Graphics Card
Sensors
Validation
Name
NVIDIA GeForce GTX 750
Lookup
GPU
GM107
Revision
A2
Technology
28 nm
Die Size
148 mm²
Release Date
Feb 18, 2014
Transistors
1870M
BIOS Version
82.07.32.00.F6
UEFI
Device ID
10DE - 1381
Subvendor
MSI (1462)
ROPs/TMUs
16 / 32
Bus Interface
PCI-E 2.0 x16 @ x16 1.1
Shaders
512 Unified
DirectX Support
11.0 / SM5.0
Pixel Fillrate
16.9 GPixel/s
Texture Fillrate
33.9 GTexel/s
Memory Type
GDDR5 (Hynix)
Bus Width
128 Bit
Memory Size
1024 MB
Bandwidth
80.2 GB/s
Driver Version
10.18.13.5850 (ForceWare 358.50) / Win7 64
GPU Clock
1059 MHz
Memory
1253 MHz
Boost
1137 MHz
Default Clock
1059 MHz
Memory
1253 MHz
Boost
1137 MHz
NVIDIA SLI
Disabled
Computing
OpenCL
CUDA
PhysX
DirectCompute 5.0
NVIDIA GeForce GTX 750
Close


0 % GPU Load
Graphics Card
Sensors
Validation
GPU Core Clock
135.0 MHz
GPU Memory Clock
202.5 MHz
GPU Temperature
44.0 °C
Fan Speed (%)
30 %
Memory Used
59 MB
GPU Load
0 %
Memory Controller Load
1 %
Video Engine Load
0 %
Bus Interface Load
0 %
Power Consumption
1.4 % TDP
PerfCap Reason
Util
VDDC
0.9560 V
Log to file
Sensor refresh rate:
0.5 sec
Continue refreshing this screen while GPU-Z is in the background
NVIDIA GeForce GTX 750
Close

8. Overige zaken

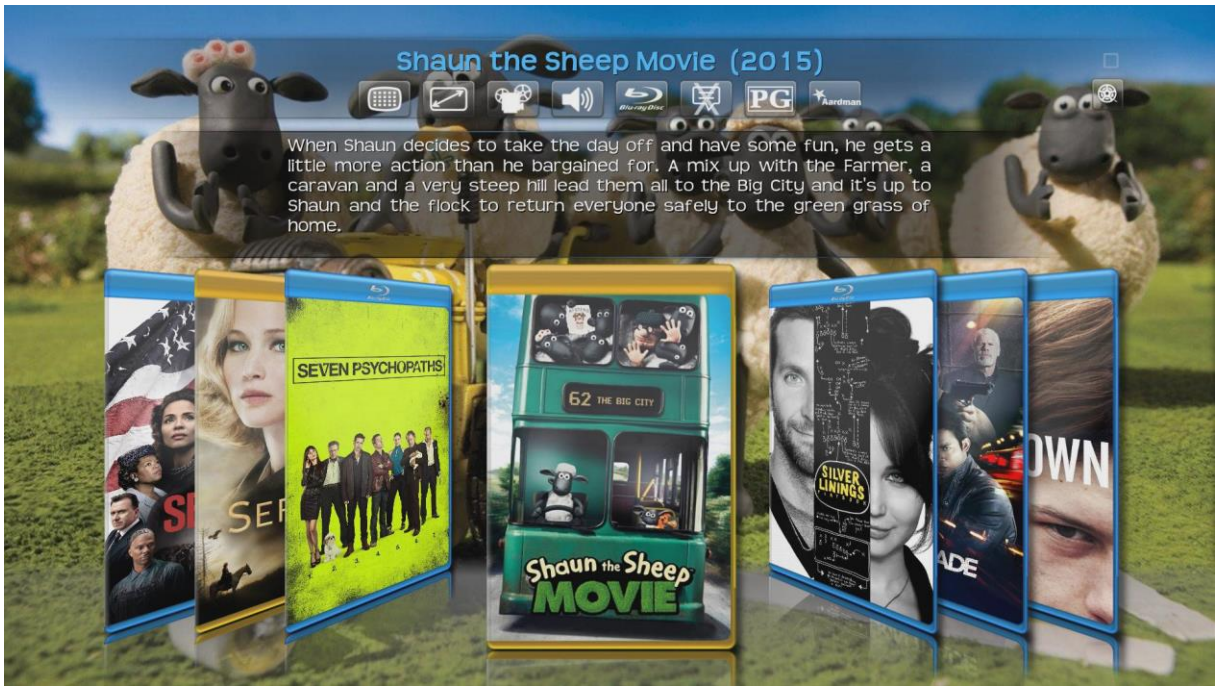
- Zet http remote control aan in Kodi:

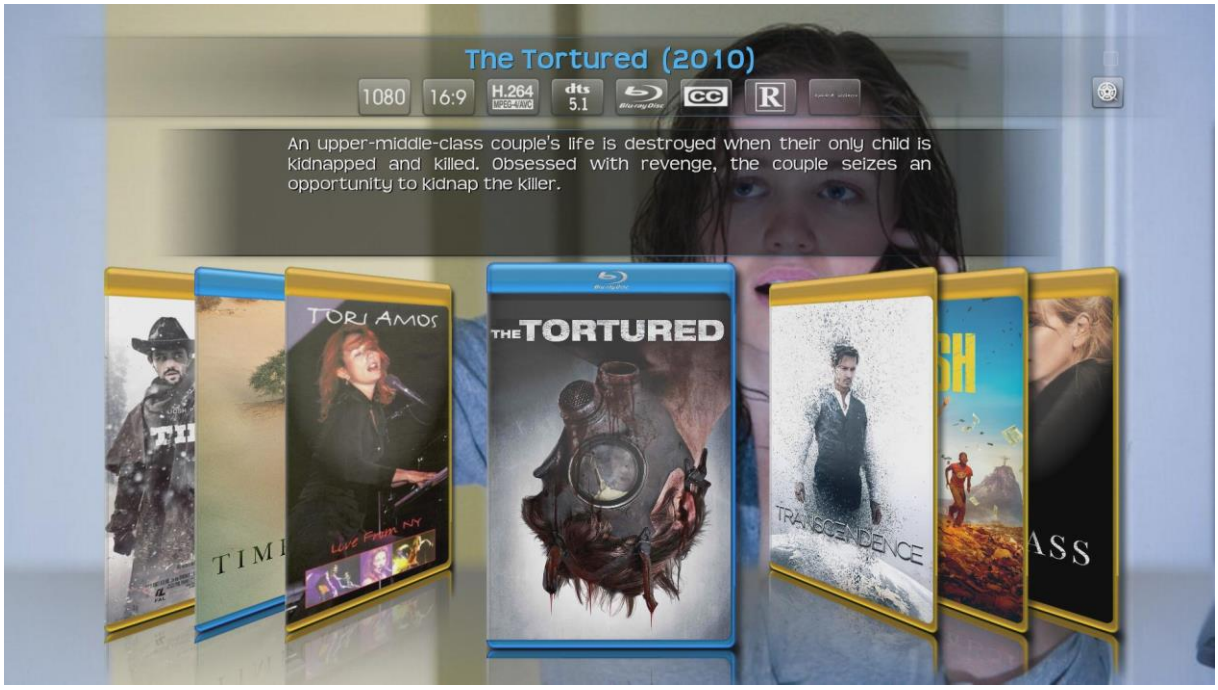


En gebruik het XBMC JSON device in irule.

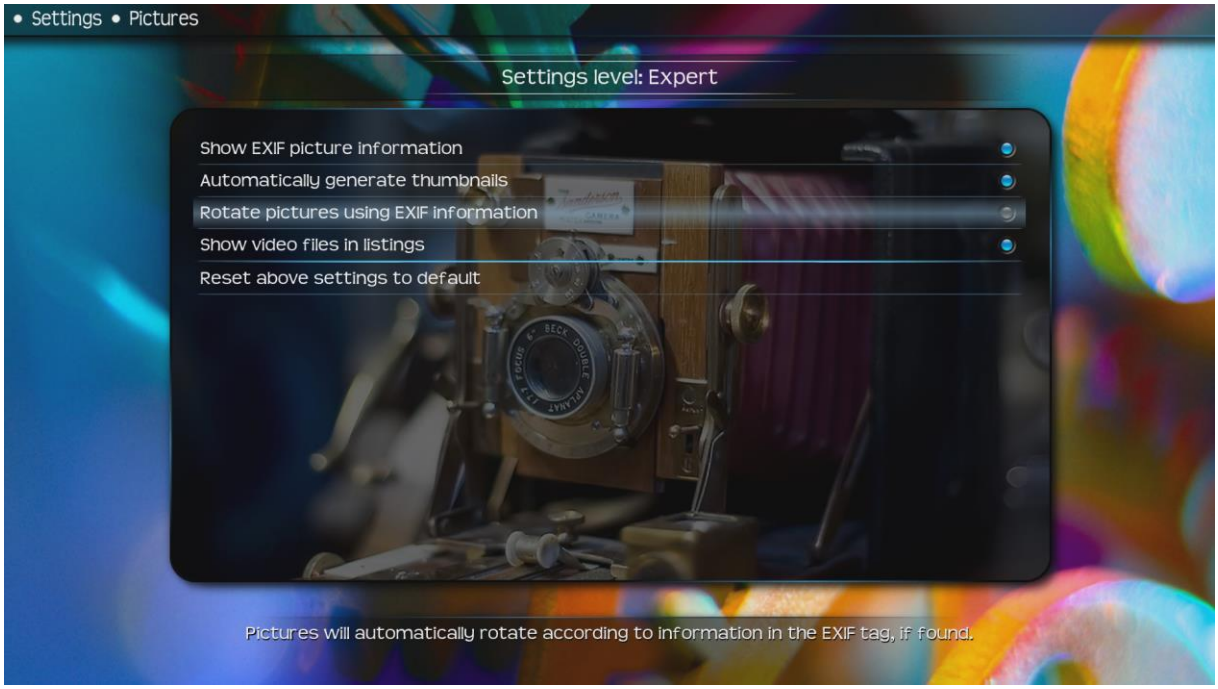
- Zet de irritante GUI geluidjes uit:

- Installeer een mooiere skin, ik gebruik op dit moment Transparancy:





- Madvr zal altijd de GPU gebruiken die als primair beeldscherm wordt gebruikt, dat kan je helaas niet wijzigen. Bij SVP kan je wel kiezen welke gpu je inzet (SVP tray menu - GPU-acceleration (OpenCL) en vervolgens kan je kiezen tussen de gpu's.
- To change between *celsius* and *fahrenheit* go to Settings -> Appearance -> International and select your location under "Region".
- Om te voorkomen dat kodi ongewenst foto's gaat "omdraaien" bij het bekijken van foto's, zet "rotate using EXIF information" uit:



- Als interne blu-ray subtitles (PSG) het niet doen:
    - Access the Audio Settings menu during playback, and enable the subtitles checkbox. Save for all videos. Also, check PGS subtitles and the correct language in the LAV Splitter. You might also have an issue with the subtitle

selection mode (do not select forced in LAV or XySubFilter if this is the incorrect mode).

- Let op: kodi ondersteund op dit moment geen shifting van embedded (PSG) subtitles!